VOLUME 17 / NUMBER 17
SEPTEMBER 8, 1979
ACC. NOS. N79-26009 TO N79-27067

STAR
AN ABSTRACT JOURNAL

Scientific and Technical Aerospace Reports

PRODUCED BY THE
SCIENTIFIC AND TECHNICAL
INFORMATION
BRANCH

NASA

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

WHAT YOU CAN DO FOR *STAR*

All users of this abstract service are urged to forward reports to be considered for announcement in *STAR*. This will aid NASA in its efforts to provide the fullest possible coverage of all scientific and technical publications that might support aeronautics and space research and development. If you have prepared relevant reports (other than those that you will transmit to NASA, DoD, or DOE through the usual contract- or grant-reporting channels), please send them for consideration to the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

Reprints of journal articles, book chapters, and conference papers are also welcome. These will be considered for announcement in *STAR's* companion journal, *International Aerospace Abstracts*.

You may specify a particular source to be included in a report announcement if you wish; otherwise the report will be placed on public sale at the National Technical Information Service. Copyrighted publications will be announced but not distributed or sold.

PURCHASE OF *STAR*

The semimonthly issues and the cumulative index issues are available postpaid on subscription and in single copy from the Superintendent of Documents, United States Government Printing Office, Washington, D.C., 20402, United States of America.

Semimonthly issues...

Annual subscription rates: $60.00 domestic; $75.00 foreign. Price per single copy: $2.50 domestic; $3.15 foreign.

Cumulative index issues, semiannual and annual ...

Annual subscription rates for both: $25.00 domestic; $31.25 foreign. Price per single copy: semiannual $9.50 domestic, $11.90 foreign; annual $16.00 domestic, $20.00 foreign.

Domestic subscription rates...

Apply to the United States, Canada, Mexico, and all Central and South American countries, except as noted below.

Foreign subscription rates...

Apply to Argentina, Brazil, French Guiana, Guyana, Surinam, Belize, and all other countries throughout the world.

Payment should be by check, money order, or document coupons, and must accompany order. Remittances from foreign countries should be made by international money order or draft on an American bank, payable to the Superintendent of Documents, or by UNESCO book coupons.

PUBLISHED BY:

UNITED STATES GOVERNMENT
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
SCIENTIFIC AND TECHNICAL INFORMATION BRANCH
Scientific and Technical Aerospace Reports, Volume 17, is prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.

The Administrator of the National Aeronautics and Space Administration has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through June 30, 1981.

US ISSN 0036-8741

INTRODUCTION

Scientific and Technical Aerospace Reports (STAR) is a major component of a comprehensive National Aeronautics and Space Administration information system covering aeronautics, space, and supporting disciplines. *STAR* is issued on the 8th and 23rd of each month and announces current publications of the following types:

- NASA, NASA contractor, and NASA grantee reports
- Reports issued by other U.S. Government agencies, domestic and foreign institutions, universities, and private firms
- Translations in report form
- NASA-owned patents and patent applications
- Dissertations and theses

Cumulative index volumes are published semiannually and annually.

Journal, book, and conference literature, cover-to-cover journal translations, and certain foreign dissertations are announced in a companion journal, *International Aerospace Abstracts (IAA)*, available on subscription from the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, N. Y. 10017.

ON-GOING RESEARCH PROJECTS

By arrangement between NASA and the Smithsonian Science Information Exchange (SSIE), a separate section of information on aerospace-related *On-Going Research Projects* is inserted into each issue of *STAR*. The insert presents titles of active NASA grants and university contracts, summary portions of recently updated *NASA Research and Technology Objectives and Plans (RTOPs)*, and notices of non-NASA research projects that were funded in the most recent or current fiscal year. The latter are selected by SSIE. The project announcements in the insert are arranged by *STAR* divisions but are otherwise entirely separate from *STAR*. They are not indexed nor machine-searchable by NASA. Current and retrospective searches are available from SSIE, 1730 M Street, N.W., Washington, D.C. 20036.

SUBJECT SCOPE

Subject scope of *STAR*, *IAA*, and *On-Going Research Projects* includes all aspects of aeronautics and space research and development, supporting basic and applied research, and applications. Aerospace aspects of earth resources, energy development, conservation, oceanography, environmental protection, urban transportation, and other topics of high national priority are also covered.

OTHER NASA PUBLICATIONS

Other NASA publications and information services are described in the publication, *The NASA Scientific and Technical Information System ... and How to Use It*, available without charge from the NASA Scientific and Technical Information Facility, P. O. Box 8757, B. W. I. Airport, Maryland 21240.

HOW TO USE STAR SUBJECT CATEGORIES

STAR is categorized by 10 major subject divisions divided into 74 specific subject categories and one general category/division. The major subject divisions are listed in the Table of Contents, together with a note for each that defines its scope and provides any cross-references. For example:

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

Each major division is further divided into as many as nine specific categories, which are identified by category numbers.

Abstracts in *STAR* are grouped by specific category, the categories appearing in sequential order. Category breaks in the abstract section are identified by the category number and title, and a scope note. Cross-references to other categories are provided as appropriate. For example:

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

CROSS-REFERENCES

Individual *STAR* abstracts are not ordinarily cross-referenced, except for certain conference reports or book translations that have had separate abstracts written for their component papers or chapters. Citations and abstracts of the components follow immediately after those of the parent document. When the subject content of a component differs sufficiently from the general content of the parent, a cross-reference citation also is printed at the end of the category to which it normally would have been assigned if it were independent.

DOCUMENTS ON MICROFICHE

Documents on microfiche[1] are designated by a pound sign (#) following the accession number. The pound sign is used without regard to the source or quality of the microfiche.

AVAILABILITIES

One or more sources from which a document announced in *STAR* is available to the public is given in each citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. If the publication is available from a source other than those listed, the publisher and his address will be displayed on the availability line or in combination with the corporate source line.

(1) A microfiche is a transparent sheet of film, 105 by 148 mm in size, containing as many as 60 to 98 pages of information reduced to micro images (not to exceed 26:1 reduction).

Avail: NTIS. Sold by the National Technical Information Service. Prices for hard copy (HC) and microfiche (MF) are indicated by a price code following the letters HC or MF in the *STAR* citation. Current values for the price codes are given in the tables on page vii.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Section, Springfield, Va. 22161.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the * symbol), use the N accession number. NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number. Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $3.00 price, for those documents identified by a # symbol.)

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: DOE Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Department of Energy reports, usually in microfiche form, are listed in *Energy Research Abstracts*. Services available from the DOE and its depositories are described in a booklet, *DOE Technical Information Center - Its Functions and Services* (TID-4660), which may be obtained without charge from the DOE Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) and microfilm. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: Fachinformationszentrum, Karlsruhe. Sold by the Fachinformationszentrum Energie, Physik, Mathematik GMBH, Eggenstein Leopoldshafen, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent and Trademark Office. Sold by Commissioner of Patents and Trademarks, U.S. Patent and Trademark Office, at the standard price of 50 cents each, postage free. (See discussion of patents and patent applications below.)

NASA PATENTS AND PATENT APPLICATIONS

Patents and patent applications owned by NASA are announced in *STAR* under appropriate subject categories and are referenced in the *STAR* indexes. In the Report/Accession Number Index, patents are indexed by the NASA Case Number (which appears in lieu of the report number in other indexes), the U.S. Patent Number, the U.S. Patent Application Serial Number, and the U.S. Patent Class. Patent applications for which patents have not yet been issued are indexed by the NASA Case Number and the U.S. Patent Application Serial Number.

NASA *patent application specifications* are sold in paper copy by the National Technical Information Service at price code A02 ($4.00 domestic, $8.00 foreign). Microfiche are sold at price code A01 ($3.00 domestic; $4.50 foreign). The US-Patent-Appl-SN- number should be used in ordering either paper copy or microfiche from NTIS. Printed copies of *patents* (which are not microfiched) are available for purchase at 50 cents per copy from:

Commissioner of Patents and Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

When ordering patents, the U.S. Patent Number should be used, and payment must be remitted in advance, preferably by money order or check payable to the Commissioner of Patents and Trademarks. Prepaid purchase coupons for ordering are also available from the Patent and Trademark Office. The patents and patent applications announced in *STAR* are owned by NASA and are available for royalty-free licensing. Requests for licensing terms and further information should be addressed to:

Assistant General Counsel for Patent Matters/Code GP-1
National Aeronautics and Space Administration
Washington, D.C. 20546

ELIGIBILITY AND REGISTRATION FOR NASA INFORMATION PRODUCTS AND SERVICES

A variety of services, in addition to the distribution of NASA scientific and technical reports and of *STAR* and its cumulative indexes, is available to organizations of the following types that have registered with NASA to receive specific services or products:

1. NASA offices, research centers, contractors, subcontractors, grantees, and consultants;

2. Other U.S. Government agencies and their contractors;
3. Libraries in the United States that have arrangements with NASA to maintain collections of NASA documents for public reference;
4. Other organizations in the United States having a need for NASA documents in work related to aeronautics and space research;
5. Organizations abroad that have established reciprocal document exchange arrangements with NASA.

Only the central service points or central points of document acquisition and control within qualified organizations are eligible to register for NASA products and services. Domestic organizations that may be eligible to receive various classes of NASA publications and services should address their requests for registration or for further information to:

NASA Scientific and Technical Information Facility
Attn.: Registration Activity
P.O. Box 8757
B.W.I. Airport, Maryland 21240

Organizations abroad should direct requests to the same address, but to the attention of: International Exchange Program.

AVAILABILITY OF STAR ABSTRACTS ON MICROFICHE

Microfiche of the abstract sections of this issue ahd other issues of *STAR* are available on annual subscription from NTIS, Attn: Subscriptions, 5285 Port Royal Road, Springfield, Virginia 22161. Annual subscription rates are $45.00 North America; $90.00 foreign. Abstract sections for previous years retroactive to 1964 are available at the current rates. Microfiche for individual *STAR* issue abstract sections are not available.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents and
Trademarks
U.S. Patent and Trademark Office
Washington, D.C. 20231

Department of Energy
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESA-Information Retrieval Service
ESRIN
Via Galileo Galilei
00044 Frascati (Rome) Italy

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B. W. I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Branch (NST-41)
Washington, D.C. 20546

National Technical Information Service
5285 Port Royal Road
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration
Building
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

Fachinformationszentrum Energie, Physik,
Mathematik GMBH
7514 Eggenstein Leopoldshafen
Federal Republic of Germany

NTIS PRICE SCHEDULES

Schedule A

STANDARD PAPER COPY PRICE SCHEDULE

(Effective October 1, 1977)

Price Code	Page Range	North American Price	Foreign Price
A01	Microfiche	$ 3.00	$ 4.50
A02	001-025	4.00	8.00
A03	026-050	4.50	9.00
A04	051-075	5.25	10.50
A05	076-100	6.00	12.00
A06	101-125	6.50	13.00
A07	126-150	7.25	14.50
A08	151-175	8.00	16.00
A09	176-200	9.00	18.00
A10	201-225	9.25	18.50
A11	226-250	9.50	19.00
A12	251-275	10.75	21.50
A13	276-300	11.00	22.00
A14	301-325	11.75	23.50
A15	326-350	12.00	24.00
A16	351-375	12.50	25.00
A17	376-400	13.00	26.00
A18	401-425	13.25	26.50
A19	426-450	14.00	28.00
A20	451-475	14.50	29.00
A21	476-500	15.00	30.00
A22	501-525	15.25	30.50
A23	526-550	15.50	31.00
A24	551-575	16.25	32.50
A25	576-600	16.50	33.00
A99	601-up	-- 1/	-- 2/

1/ Add $2.50 for each additional 100 page increment from 601 pages up.

2/ Add $5.00 for each additional 100 page increment from 601 pages up.

Schedule E

EXCEPTION PRICE SCHEDULE

Paper Copy & Microfiche

Price Code	North American Price	Foreign Price
E01	$ 3.25	$ 6.50
E02	4.75	9.50
E03	6.25	12.50
E04	7.50	15.00
E05	9.00	18.00
E06	10.50	21.00
E07	12.50	25.00
E08	15.00	30.00
E09	17.50	35.00
E10	20.00	40.00
E11	22.50	45.00
E12	25.00	50.00
E13	28.00	56.00
E14	31.00	62.00
E15	34.00	68.00
E16	37.00	74.00
E17	40.00	80.00
E18	45.00	90.00
E19	50.00	100.00
E20	60.00	120.00
E99 - Write for quote		
N01	28.00	40.00

VOLUME 17 NUMBER 17 / SEPTEMBER 8, 1979

TABLE OF CONTENTS

AERONAUTICS

Includes aeronautics (general); aerodynamics; air transportation and safety; aircraft communications and navigation; aircraft design, testing and performance; aircraft instrumentation; aircraft propulsion and power; aircraft stability and control; and research and support facilities (air).

For related information see also *Astronautics*.

01 AERONAUTICS (GENERAL) 2215

02 AERODYNAMICS 2215

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer*.

03 AIR TRANSPORTATION AND SAFETY 2218

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION 2219

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command and Tracking* and *32 Communications*.

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE 2220

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics*.

06 AIRCRAFT INSTRUMENTATION 2221

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

07 AIRCRAFT PROPULSION AND POWER 2222

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

08 AIRCRAFT STABILITY AND CONTROL 2223

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

09 RESEARCH AND SUPPORT FACILITIES (AIR) 2223

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space)*.

ASTRONAUTICS

Includes astronautics (general); astrodynamics; ground support systems and facilities (space); launch vehicles and space vehicles; space transportation; spacecraft communications, command and tracking; spacecraft design, testing and performance; spacecraft instrumentation; and spacecraft propulsion and power.

For related information see also *Aeronautics*.

12 ASTRONAUTICS (GENERAL) 2225

For extraterrestrial exploration see *91 Lunar and Planetary Exploration*.

13 ASTRODYNAMICS 2225

Includes powered and free-flight trajectories; and orbit and launching dynamics.

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE) N.A.

Includes launch complexes, research and production facilities; ground support equipment, e.g., mobile transporters; and simulators.

For related information see also *09 Research and Support Facilities (Air)*.

15 LAUNCH VEHICLES AND SPACE VEHICLES 2228

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

16 SPACE TRANSPORTATION 2229

Includes passenger and cargo space transportation, e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation*.

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING N.A.

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications*.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE N.A.

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

19 SPACECRAFT INSTRUMENTATION **N.A.**
For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

20 SPACECRAFT PROPULSION AND POWER **2230**
Includes main propulsion systems and components, e.g., rocket engines; and spacecraft auxiliary power sources.
For related information see also *07 Aircraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion*.

CHEMISTRY AND MATERIALS

Includes chemistry and materials (general); composite materials; inorganic and physical chemistry; metallic materials; nonmetallic materials; and propellants and fuels.

23 CHEMISTRY AND MATERIALS (GENERAL) **2231**
Includes biochemistry and organic chemistry.

24 COMPOSITE MATERIALS **2231**
Includes laminates.

25 INORGANIC AND PHYSICAL CHEMISTRY **2232**
Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.
For related information see also *77 Thermodynamics and Statistical Physics*.

26 METALLIC MATERIALS **2236**
Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

27 NONMETALLIC MATERIALS **2242**
Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

28 PROPELLANTS AND FUELS **2245**
Includes rocket propellants, igniters, and oxidizers; storage and handling; and aircraft fuels.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power,* and *44 Energy Production and Conversion*.

ENGINEERING

Includes engineering (general); communications; electronics and electrical engineering; fluid mechanics and heat transfer; instrumentation and photography; lasers and masers; mechanical engineering; quality assurance and reliability; and structural mechanics.
For related information see also *Physics*.

31 ENGINEERING (GENERAL) **2247**
Includes vacuum technology; control engineering; display engineering; and cryogenics.

32 COMMUNICATIONS **2249**
Includes land and global communications; communications theory; and optical communications.
For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking*.

33 ELECTRONICS AND ELECTRICAL ENGINEERING **2254**
Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.
For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

34 FLUID MECHANICS AND HEAT TRANSFER **2261**
Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.
For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

35 INSTRUMENTATION AND PHOTOGRAPHY **2264**
Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.
For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation* and *19 Spacecraft Instrumentation*.

36 LASERS AND MASERS **2266**
Includes parametric amplifiers.

37 MECHANICAL ENGINEERING **2268**
Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

38 QUALITY ASSURANCE AND RELIABILITY **2270**
Includes product sampling procedures and techniques; and quality control.

39 STRUCTURAL MECHANICS **2271**
Includes structural element design and weight analysis; fatigue; and thermal stress.
For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

GEOSCIENCES

Includes geosciences (general); earth resources; energy production and conversion; environment pollution; geophysics; meteorology and climatology; and oceanography.
For related information see also *Space Sciences*.

42 GEOSCIENCES (GENERAL) **N.A.**

43 EARTH RESOURCES 2273
Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

44 ENERGY PRODUCTION AND CONVERSION 2277
Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.
For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation*.

45 ENVIRONMENT POLLUTION 2286
Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

46 GEOPHYSICS 2291
Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.
For space radiation see *93 Space Radiation*.

47 METEOROLOGY AND CLIMATOLOGY 2295
Includes weather forecasting and modification.

48 OCEANOGRAPHY 2312
Includes biological, dynamic and physical oceanography; and marine resources.

LIFE SCIENCES

Includes life sciences (general); aerospace medicine; behavioral sciences; man/system technology and life support; and planetary biology.

51 LIFE SCIENCES (GENERAL) 2313
Includes genetics.

52 AEROSPACE MEDICINE 2314
Includes physiological factors; biological effects of radiation; and weightlessness.

53 BEHAVIORAL SCIENCES 2315
Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT 2316
Includes human engineering; biotechnology; and space suits and protective clothing.

55 PLANETARY BIOLOGY N.A.
Includes exobiology; and extraterrestrial life.

MATHEMATICAL AND COMPUTER SCIENCES

Includes mathematical and computer sciences (general); computer operations and hardware; computer programming and software; computer systems; cybernetics; numerical analysis; statistics and probability; systems analysis; and theoretical mathematics.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL) N.A.

60 COMPUTER OPERATIONS AND HARDWARE 2317
Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering*.

61 COMPUTER PROGRAMMING AND SOFTWARE 2319
Includes computer programs, routines, and algorithms.

62 COMPUTER SYSTEMS 2322
Includes computer networks.

63 CYBERNETICS 2322
Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support*.

64 NUMERICAL ANALYSIS 2323
Includes iteration, difference equations, and numerical approximation.

65 STATISTICS AND PROBABILITY 2327
Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

66 SYSTEMS ANALYSIS 2328
Includes mathematical modeling; network analysis; and operations research.

67 THEORETICAL MATHEMATICS 2228
Includes topology and number theory.

PHYSICS

Includes physics (general); acoustics; atomic and molecular physics; nuclear and high-energy physics; optics; plasma physics; solid-state physics; and thermodynamics and statistical physics.
For related information see also *Engineering*.

70 PHYSICS (GENERAL) 2329
For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar Physics*.

71 ACOUSTICS 2329
Includes sound generation, transmission, and attenuation.
For noise pollution see *45 Environment Pollution*.

72 ATOMIC AND MOLECULAR PHYSICS 2330
Includes atomic structure and molecular spectra.

73 NUCLEAR AND HIGH-ENERGY PHYSICS 2332
Includes elementary and nuclear particles; and reactor theory.
For space radiation see *93 Space Radiation*.

74 OPTICS 2335
Includes light phenomena.

75 PLASMA PHYSICS 2336
Includes magnetohydrodynamics and plasma fusion.
For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

76 SOLID-STATE PHYSICS 2339
Includes superconductivity.
For related information see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

77 THERMODYNAMICS AND STATISTICAL PHYSICS 2344
Includes quantum mechanics; and Bose and Fermi statistics.
For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer*.

SOCIAL SCIENCES

Includes social sciences (general); administration and management; documentation and information science; economics and cost analysis; law and political science; and urban technology and transportation.

80 SOCIAL SCIENCES (GENERAL) N.A.
Includes educational matters.

81 ADMINISTRATION AND MANAGEMENT 2245
Includes management planning and research.

82 DOCUMENTATION AND INFORMATION SCIENCE 2346
Includes information storage and retrieval technology; micrography; and library science.
For computer documentation see *61 Computer Programming and Software*.

83 ECONOMICS AND COST ANALYSIS N.A.
Includes cost effectiveness studies.

84 LAW AND POLITICAL SCIENCE N.A.
Includes space law; international law; international cooperation; and patent policy.

85 URBAN TECHNOLOGY AND TRANSPORTATION 2348
Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.
For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

SPACE SCIENCES

Includes space sciences (general); astronomy; astrophysics; lunar and planetary exploration; solar physics; and space radiation.
For related information see also *Geosciences*.

88 SPACE SCIENCES (GENERAL) N.A.

89 ASTRONOMY 2350
Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

90 ASTROPHYSICS 2351
Includes cosmology; and interstellar and interplanetary gases and dust.

91 LUNAR AND PLANETARY EXPLORATION 2352
Includes planetology; and manned and unmanned flights.
For spacecraft design see *18 Spacecraft Design, Testing and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

92 SOLAR PHYSICS 2352
Includes solar activity, solar flares, solar radiation and sunspots.

93 SPACE RADIATION 2352
Includes cosmic radiation; and inner and outer earth's radiation belts.
For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

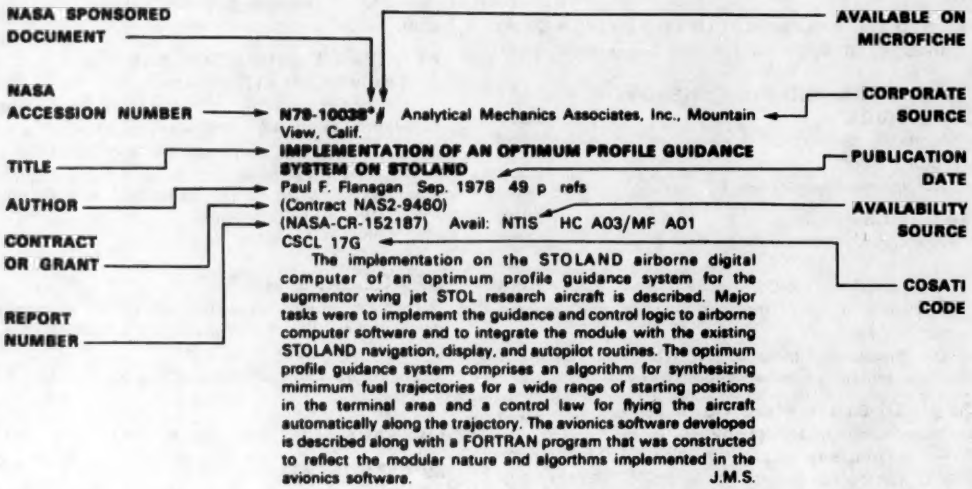
GENERAL

99 GENERAL 2353

Note: N.A. means that no abstracts were assigned to this category for this issue.

SUBJECT INDEX I-1
PERSONAL AUTHOR INDEX I-51
CORPORATE SOURCE INDEX I-59
CONTRACT NUMBER INDEX I-73
REPORT/ACCESSION NUMBER INDEX I-77

TYPICAL CITATION AND ABSTRACT


NASA SPONSORED DOCUMENT
AVAILABLE ON MICROFICHE
NASA ACCESSION NUMBER
N79-10038* # Analytical Mechanics Associates, Inc., Mountain View, Calif.
CORPORATE SOURCE
TITLE
IMPLEMENTATION OF AN OPTIMUM PROFILE GUIDANCE SYSTEM ON STOLAND
PUBLICATION DATE
AUTHOR
Paul F. Flanagan Sep. 1978 49 p refs
CONTRACT OR GRANT
(Contract NAS2-9460)
AVAILABILITY SOURCE
REPORT NUMBER
(NASA-CR-152187) Avail: NTIS HC A03/MF A01
CSCL 17G
COSATI CODE
The implementation on the STOLAND airborne digital computer of an optimum profile guidance system for the augmentor wing jet STOL research aircraft is described. Major tasks were to implement the guidance and control logic to airborne computer software and to integrate the module with the existing STOLAND navigation, display, and autopilot routines. The optimum profile guidance system comprises an algorithm for synthesizing mimimum fuel trajectories for a wide range of starting positions in the terminal area and a control law for flying the aircraft automatically along the trajectory. The avionics software developed is described along with a FORTRAN program that was constructed to reflect the modular nature and algorithms implemented in the avionics software.
J.M.S.

ON-GOING RESEARCH PROJECTS

This is a listing of research projects - not publications

AERONAUTICS

Includes Aeronautics (general); Aerodynamics; Air Transportation and Safety; Aircraft Communications and Navigation; Aircraft Design, Testing, and Performance; Aircraft Instrumentation; Aircraft Propulsion and Power; Aircraft Stability and Control; and Research and Support Facilities (air). For Related Information See Also Astronautics.

1.0001, LARGE AREA COMPOSITE STRUCTURE REPAIR

R.W. Kiger, Northrop Corp., *3901 W. Broadway, Hawthorne, California* 90250 (DF135810; F33615-76-C-3017)

Advanced composite structural components are now in limited use on military aircraft. Future weapon systems will use composite structural materials in wider applications. Required criteria, techniques and facilities for depot level repair do not exist. This effort will develop and provide needed criteria and techniques to perform cost-effective repair which will minimize life cycle costs.

Cost-effective depot level repair criteria and techniques applicable to large area advanced composite structure on military aircraft will be developed. A review of advanced composite structure technology and the operations, facilities and capabilities of AFLC maintenance and repair depots will be followed by an in-depth study and analysis of the unique problems encountered in the repair of large area composite structure. A number of specific repairs will be made on which structural tests will be conducted.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0002, INVESTIGATION OF HELICOPTER COMPONENT FAILURE PROGNOSIS

J.J. Reis, Northrop Corp., Research & Technology Center, *3901 W. Broadway, Hawthorne, California* 90250 (DA0D3989; DAAJ02-75-C-0019)

The objective of this program is to obtain and analyze data on the relationship of specific sensory outputs to a helicopter gearbox's condition and to investigate their applicability on the determination of the remaining useful life of the component. The efforts to be performed are intended to complement the completed program for investigation of helicopter component failure prognosis under USAAMRDL contract number DAAJ02-72-C-0118.

Conduct mechanical component tests using government-furnished UH-1 series 90 degrees gearboxes in an improved test cell facility capable of providing continuous data collection. Ten gearboxes with incipient bearing failures will be tested over a total test period of 5000 hours. The data shall be processed and analyzed to establish valid predictions of gearbox failure time, time of maximum gearbox deterioration, etc.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Applied Technology Lab.

1.0003, INVESTIGATION OF ADVANCED PROGNOSTIC ANALYSIS TECHNIQUES

J.J. Reis, Northrop Corp., Research & Technology Center, *3901 W. Broadway, Hawthorne, California* 90250 (DA0E3782; DAAJ02-77-C-0054)

To analyze data acquired under a previous Northrop contract, DAAJ02-75-C-0019, where vibration data was acquired from UH-1 helicopter gearboxes which were run in a test cell at the contractor's facility to failure. The purpose of the analysis effort will be one of evaluating signal processing techniques for their ability to prognosticate gearbox failures.

The contract will perform a theoretical investigation and data analysis to develop and optimize trend detection and prediction algorithms for application to the test cell data previously collected. The mathematical concepts to be investigated shall emphasize: (1) the reverse arrangement trend detection, (2) cepstrum, and (3) matched filter techniques. Comprehensive data processing shall be conducted to determine the quantitative performance on the test cell data of the various algorithms developed. A parametric study shall be performed comparing the onset of trend detection with each enhancement technique versus observation time and trend prediction accuracy.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Air Mobility Research & Development Lab.

1.0004, ADVANCED CONCEPTS FOR COMPOSITE STRUCTURE JOINTS AND ATTACHMENT FITTINGS

N.J. Mocerino, Summa Corp., Hughes Helicopters Division, *Centinela Ave. & Teale St., Culver City, California* 90230 (DA0E3800; DAAJ02-77-C-0076)

The objective of this program is to develop the necessary methodology for designing composite joints and attachment fittings permitting disassembly for joining major structural components.

Efforts will be made to survey, design, evaluate and establish representative attachment fittings and joints (composite or metal) for attaching composite structures to new or existing structural members of the helicopter, such as attaching a composite vertical fin to a tailboom or attaching an all-composite tailboom to an existing helicopter. This program will include analyzing structural design and methods for shear-diffusing concentrated loads at point of attachment to outer skins and/or areas of less stress intensity. The results shall be put in the form of a design guide.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0005, HEAD-UP DISPLAY EVALUATION

Unknown, U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology, Ames Research Center, *Moffett Field, California* 94035 (FA77WAI-725; FA160245 (TRAIS NO.))

The purpose is to determine, by cooperative NASA/FAA effort using simulation and laboratory studies, what contribution, if any, a head-up display (HUD) can add to aviation safety in the operations of large turbojet aircraft. Within the scope of this evaluation, a comprehensive Program Plan should be developed to meet the overall objectives of this effort and to establish valid methods of determining the interrelationship between the crew, the aircraft and the cockpit displays through simulation and laboratory experiments.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

1.0006, PERFORM COMPUTATION OF POSTBUCKLING LOADS AND DEFLECTIONS IN SHELL STRUCTURES
G.A. Thurston, University of Colorado, Denver Campus, School of Engineering, Dept. of Mechanical Engineering, *1100 14th St., Denver, Colorado* 80202 (NAS 1-15775)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

1.0007, FEASIBILITY STUDY FOR ADVANCED TECHNOLOGY INTEGRATION FOR GENERAL AVIATION
J. Roskam, University of Kansas, Lawrence Campus, School of Engineering, Dept. of Aerospace Engineering, *Learned Hall, Lawrence, Kansas* 66044 (NAS 1-15770)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

1.0008, HELICOPTER CONTROL SIMPLIFICATION
J.A. Stephens, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Human Engineering Labs., *Aberdeen Proving Ground, Maryland* 21005 (DA0C4935)

To determine the feasibility of integrating and/or simplifying the characteristics of helicopter primary flight controls to achieve reduced complexity in regard to overall task loading and training of flight personnel.

The control of helicopters is characterized by two separate control devices, viz., collective and cyclic. This requirement for two-handed operation has necessitated the location of secondary control and actuation devices on the cyclic and collective sticks and, to some extent, has placed limitations on cockpit configuration. Mechanical control concepts are being designed and fabricated for utilization in the Human Engineering Laboratory's GAT simulator. The primary objective is to determine any differences in flight performance with the integrated control concept versus the current two-handed mode. Assuming success in this first phase, the control concept will be tested in a TH-55A. The implications of an integrated control on helicopter displays and controls and cockpit configuration will also be studied.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Human Engineering Labs.

1.0009, TRANSIENT TEMPERATURES IN AIRCRAFT TIRES
S.K. Clark, University of Michigan, Ann Arbor Campus, School of Engineering, Dept. of Engineering Mechanics, *Ann Arbor, Michigan* 48104 (NSG 1607)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

1.0010, STOL ASSAULT TRANSPORT CREW COMPLEMENT STUDY
J.C. Wolf, Honeywell Inc., *2600 Ridgeway Parkway N.E., Minneapolis, Minnesota* 55413 (DF139620; F33615-77-C-3065)

The work performed will support the test and evaluation functions of AF organizations involved in weapon system development. Crew station evaluation techniques will be developed and utilized in the determination of the total flightcrew complement required for the accomplishment of the tactical assault transport mission. This effort will address the crew fatigue and aircraft operation and control aspects of the crew size/composition problem, as well as investigate/develop crew workload prediction methodologies. The baseline and experience required for the development of a methodology to achieve optimal crew systems configurations which are motivated by operational concepts will result from this effort.

Mission scenarios will be generated to include total crew duties and tasks associated with the transport mission. A mission script will be developed which considers all transport crew functions. Crew station assessment efforts, sensitive to crew workload, will be pursued utilizing physiological, psychological, and mission performance data. The crew performance will be evaluated in a real time operational theater.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0011, EFFECTS OF HORIZONTAL FIBER LAYERS IN PAVEMENT SYSTEMS
D.M. Ladd, U.S. Dept. of Defense, Army, Corps of Engineers, Waterways Experiment Station, *P.O. Box 631, Vicksburg, Mississippi* 39180 (DA0X8180)

To determine the reinforcing effect of thin, horizontally oriented fiber cloth and fiber membrane layers placed between normal pavement layers or between the pavement structure and subgrade of various military road and airfield pavement systems.

Document through field performance surveys and design data reviews recent qualitative engineering reports of pavement performance benefits derived from internal placement of horizontal fiber cloth layers in flexible pavement sections. Explore and isolate primary reasons for improved performance through analysis and component laboratory and field tests; filtering action, pore water pressure dissipation and resistance to horizontal torsional forces will be investigated. If successful in validating and quantifying the improved performance, follow-on efforts to develop design and construction criteria will be initiated.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Waterways Experiment Station

1.0012, AIRPORT PAVEMENT PERFORMANCE ANALYSIS
Unknown, U.S. Dept. of Defense, Army, Corps of Engineers, Waterways Experiment Station, *P.O. Box 631, Vicksburg, Mississippi* 39180 (FA78WAI-846; FA161217 (TRAIS NO.))

The purpose of this effort is to develop, demonstrate, and revise as needed, a system of condition data collection for civil airport pavements. Within this framework, two specific objectives are as follows: a. Develop a procedure based on the current state-of-the-art that will provide for analysis of the present condition of a pavement, and will compare this condition with that anticipated at time of design; and b. Validate the procedure at civil airports to assure the practicality of the methodology.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

1.0013, BOLTED FIELD REPAIRS FOR COMPOSITE STRUCTURES
J. Watson, McDonnell Douglas Corp., *P.O. Box 516, St. Louis, Missouri* 63166 (DN881338; N62269-77-C-0366)

To develop and demonstrate field repair techniques using mechanical fasteners for composite monolithic wing skins generic to emerging Navy aircraft. To provide simplified composite repair methods which can be performed by organizational level personnel with minimal special training and logistic support. This work is in support of work unit ZA601 'Aircraft Technology', Agency Accession No. DN 681080.

Various designs for field repair of graphite/epoxy structures using mechanical fasteners will be investigated. Wing skin damage with through the thickness holes of up to 4 inch diameter in thicknesses of up to 1/2 inch will be investigated. The repair concept will be designed so that it can sustain a gross strain in the repaired area of more than 4000 micro in/in while restoring the original stiffness. Additional constraints such as access from the outside surface only, relaxed tolerances for field capabilities, minimal external protrusions, fuel containment and environmental considerations will also be considered in the design. Appropriate analysis will be performed to support the repair design concepts and will indicate sufficient safety margins for deviations in fabrication procedures due to field equipment and variability in workmanship and materials. An appropriate number of specimens will be fabricated and tested statically to evaluate the effectiveness of the selected repair designs.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

1.0014, NAVION MODIFICATION AND FLIGHT TEST SUPPORT

R.F. Stengel, Princeton University, Graduate School, *205 Nassau Hall, Princeton, New Jersey* 08540 (NAS 1-15758)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

1.0015, INVESTIGATION OF FLYING QUALITIES CRITERIA FOR SINGLE PILOT INSTRUMENT FLIGHT OPERATIONS

R.F. Stengel, Princeton University, Graduate School, *205 Nassau Hall, Princeton, New Jersey* 08540 (NAS 1-15764)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

1.0016, ADVANCED CONTROL DISPLAY CONCEPTS FOR FLIGHT CONTROLS OF AIRCRAFT WITH ADDITIONAL DEGREES OF FREEDOM AND PERFORMANCE CONSTRAINTS

P.J. Clough, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF141740)

This work unit supports TPO3, flight control, and major thrust FG02, crew systems integration. The function of this effort is to investigate advanced controls and displays. Deficiencies now exist for aircraft flying complex trajectories afforded by the proposed microwave landing system for various aircraft including AFTI, V/STOL, etc. The objective is to first determine the control display needs, if any, and then through total crew systems integration, identify the pilot interface requirements to implement advanced control modes into military aircraft. This program relates to the military mission by providing inputs to programs such as AFTI, CCV, IFFC concerning future crew systems technology.

Advanced control techniques and scenarios for various Air Force missions are being studied to identify crew systems deficiencies. In essence this means working closely with other programs like AFTI to identify the salient crew system technology issues and also integrating the results of related cockpit design studies. Efforts will then concentrate on identifying the work needed to resolve these crew systems technology deficiencies. The final product will be the criteria for crew systems technology development.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0017, METALLIC BOX BEAM DESIGN CONCEPTS EVALUATION

G.T. Estill, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF131230)

Application of new and improved structural airframe concepts is restricted for lack of demonstrated and validated cost savings, weight savings, and structural integrity. A cooperative effort with LTV(VSD) will investigate advanced low-cost structural concepts in terms of weight savings, cost savings, and structrual performance using box beam components designed and tested to the same aircraft design requirements. A weight savings of 22 percent and a cost savings of 25 percent compared to conventional baseline box beam should be validated.

An A-7D outer wing box beam component will be used to evaluate and compare three advanced metallic design concepts with a conventional baseline concept. Two fatigue and one fracture article will be fabricated and tested for each design concept. Structural tests will be conducted to compare fatigue and damage tolerance performance of each concept. Other comparisons including weight and cost savings will be made to demonstrate the benefits of the application of advanced metallic structures technology to include composite reinforced metal lamination, adhesive bonding and low-cost fabrication techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0018, IMPROVED AEROELASTIC TAILORING AND STRUCTURAL OPTIMIZATION

T.J. Hertz, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF140800)

Through the application of aeroelastic tailoring of advanced composite structures, it has been shown feasible to aeroelastically deform the lifting surfaces of advanced fighter aircraft to provide improved performance of these aircraft. Prevention of flutter in thin wings has been achievable analytically while providing minimum drag and maneuver load relief. With the improvements in the wing aeroelastic synthesis procedure (computer program TSO), such as the addition of flexible control surfaces and improved drag calculations, the possibility of increasing the uses of the computer program (TSO) exists. The objective of this work unit would be to continue work on the computer program (TSO) in order to increase its efficiency, improve its optimization scheme, and increase the potential for use on a wider range of aircraft.

The approach to the program would be divided into two parts running concurrently. The first part would concentrate on improving the efficiency of the computer program (TSO) and improving and/or replacing the optimization scheme and other algorithms in order to apply it to a wider range of problems (i.e. non-planar wings, wings with stores). The second part, begun shortly after the start of the program, would be devoted to the use of the computer program (TSO) on two aircraft configurations. These aircraft configurations would be selected on the basis of most beneficial application of aeroelastic tailoring.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0019, STABILITY AND CONTROL FLIGHT RESEARCH ANALYSIS AND DATA CORRELATION

S.F. Lash, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF133450)

This work unit supports TPO 3, flight control, and specific goal FG02B, flight control system design techniques. Specifically the level of accuracy is not well known of current stability and control design methods used in aircraft development. The objective of this program is to determine the correlation of stability and control data extracted from flight test with predicted characteristics, using present state-of-the-art analytical methods and test procedures. This knowledge is required to better design future aircraft systems.

The approach to this problem is to extract a consistent and repeatable set of stability derivatives and handling qualities parameters from flight test data on a variable sweep aircraft. These data will be correlated with predicted characteristics as derived using (1) analysis incorporating wind tunnel data from models having both rigid and aeroelastic wings and (2) from analytical methods employing theoretical and/or semiempirical estimates.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0020, DUCT ACOUSTICS RESEARCH

D.W. Quinn, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF138560)

To understand the dependence of sound levels within ducts upon such factors as duct geometry, sound absorbing properties of the duct walls, type of sound source, and flow within the duct. Specifically, to develop new aero-acoustic models and solution techniques for general duct acoustics problems. This work will be a significant contribution to the AF Aero Propulsion Laboratory's efforts to reduce turbine engine noise levels. To quote RN-AFAPL-08-72-9, 'Current engine noise levels are hazardous to personnel and structures, detrimental to tactical operations and annoying to the general public.' Eventually we should be able to 'assess engine performance/noise trades' in the design of aircraft engines.

To handle variable area ducts with no flow a method of conformal mapping in conjunction with a finite difference method is used. As an alternative approach for the same problem an integral equation/potential theoretic method is appropriate. For the more general problem of variable area ducts containing fairly general

flows a finite element method may be required. The acoustic equation for this general problem must be derived and an efficient numerical method must be implemented using local computer facilities.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0021, APPLICATION OF FLIGHT LOADS DATA TO THE DEVELOPMENT OF USAGE AND ENVIRONMENTAL SPECTRA

L.E. Clay, University of Dayton, Graduate School, *300 College Park Ave., Dayton, Ohio* 45469 (DF139950; F33615-77-C-3038)

This work unit is being established in order to make available flight loads data which is to be used for design, analysis, and testing of aircraft structures. Recent advances in structural loads data collection methods and equipment have generated large amounts of comprehensive data. There exists at this time no widely accepted method for presenting this data in useful form to aircraft structural designers and analysts. The objective of this effort is to produce a handbook containing significant amounts of data from various types of aircraft, presented so as to be useful to performing analysis and testing as well as to complement structural specifications. Availability of the actual data will lead to more realistic structural test spectra and more representative results.

A handbook containing data and methodology for creating flight-by-flight sequences of loads/stresses will be produced under contract through a multi-source procurement.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0022, STUDY OF THE EFFECTS OF HEAVY RAINS ON AIRCRAFT AERODYNAMICS

J.K. Luers, University of Dayton, Graduate School, *300 College Park Ave., Dayton, Ohio* 45469 (NSG 6026)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

1.0023, EVALUATION OF PYLON FOCUSING FOR REDUCED HELICOPTER VIBRATION

G.S. Doman, Boeing Co., Vertol Division, *P.O. Box 16858, Philadelphia, Pennsylvania* 19142 (DA0D4118; DAAJ02-77-C-0034)

Determine the effects of pylon focusing on rotor-induced fuselage vibration for helicopters having rotor systems subjected to both vibratory hub shear forces and moments.

Wind-tunnel test a scale-model hingeless rotor to study pylon focusing requirements in the presence of rotor hub moments and shear forces for various flight regimes. Study: how focalization affects the transmission of vibratory rotor loads into the fuselage structure; if there are unique focal points for various flight conditions; optimum focalization to minimize vibration; and how the residual vertical vibratory forces vary with flight condition.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Air Mobility Research & Development Lab.

1.0024, NAVTOLAND SIMULATION COORDINATION

C.J. Mazza, U.S. Dept. of Defense, Navy, Naval Air Development Center, Air Vehicle Technology Dept., *Warminster, Pennsylvania* 18974 (DN781089)

To plan, monitor, and perform, as required, all simulation programs related to NAVTOLAND (Navy vertical takeoff and landing) and to insure that requirements for simulator visual, motion, and computer systems imposed by these programs are met.

Assess various concepts advanced by NAVTOLAND support technologies as they impact simulation facility capabilities. Assess existing simulation facilities in terms of these required capabilities. Develop an integrated plan for simulation facility improvement and NAVTOLAND concept evaluations. Adapt recent ship motion and airwake data for simulation application. Develop suitable simulation math models for V/STOL aircraft and NAVTOLAND concepts. Plan and perform specific concept evaluations identified in the overall simulation plan.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Systems Command, Advanced Systems Concepts Div.

1.0025, DYNAMIC FLIGHT SIMULATION OF V/STOL OPERATIONS - DETERMINATION OF FEASIBILITY

E. Fessenden, U.S. Dept. of Defense, Navy, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate, *Warminster, Pennsylvania* 18974 (DN681274)

To determine those acceleration conditions encountered in V/STOL operations that contribute to operator control problems. To assess specific problems of operator control and to determine the feasibility of dynamic flight simulation in studying the interactions of flight dynamic, sensory information and operator response characteristics in the control of V/STOL aircraft.

(1) Determine acceleration conditions encountered in V/STOL operations particularly during hover and transition phases of flight. (2) Conduct interviews, develop questionnaires, and consult technical/operational personnel regarding control problems encountered in V/STOL operations. (3) Conduct literature searches on the effects of accelerations determined above on the sensory/response characteristics of human operators. (4) Assess the feasibility of centrifuge dynamic flight simulation (open and closed loop) for investigation of the problem. (5) Conduct specific dynamic flight simulations of V/STOL operations. The thrust vector control will be added to an existing aircraft and available space will be reduced to conform to the smaller V/STOL aircraft. Our first effort will simulate motion only; however, the option of including additional displays such as HUD in the cockpit at a later date (when expanded computer capability is available) will be kept open. The cockpit will be V/STOL dedicated.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Development Center

1.0026, IMPROVEMENT OF C-81 USING AH-1G DATA

J.R. VanGaasbeek, Bell Helicopter Co., Division of Textron Inc, *P.O. Box 482, Fort Worth, Texas* 76101 (DA0D4087; DAAJ02-77-C-0003)

To validate the capability of the rotorcraft flight simulation, computer program C-81 to predict rotor blade loads and motions, rotor hub/shaft loads and motions, fuselage accelerations and vibrations and other flight parameters including engine torque, aircraft attitude, control positions and main and tail rotor power and to assess the adequacy of the data obtained under contract DAAJ02-73-C-0105 for correlation/validation purposes.

The rotorcraft flight simulation will be modified to improve the rotor loads calculation. Other minor modifications will be made to the computer program to aid simulation of flight test maneuvers and to provide better understanding of the computed results. A correlation of the program with flight test data from the aerodynamic and structural loads survey of the AH-1G will be used to evaluate the accuracy of the program, the adequacy of the flight test data-gathering techniques and overall plan and the suitability of the data for computer program validation.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Air Mobility Research & Development Lab.

1.0027, HT PP 78-07 - EVALUATION OF THE BENEFITS OF USING THE PRESSURIZED AIR START SYSTEM (PASS) FOR ARMY HELICOPTERS

P. Chesser, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3810)

The objective of the program is to determine the benefits of using the PASS on other future Army helicopters.

Current propulsion engine start systems will be analyzed relative to cost, weight, and R&M to establish a baseline for comparison with the PASS. Utilizing the results of an 'evaluation of pressurized air start system for advanced Army helicopters

(6000-7000 pound GW)' conducted by Airesearch under contract DAAJ02r77-C-0007, a comparison will be made to determine the benefits of using the PASS.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0028, HT PP 78-13 - DRIVE TRAIN COST ANALYSIS
Unknown, U.S. Dept. of Defense, Army, Aviation Research & Development Command, Applied Technology Lab., *Fort Eustis, Newport News, Virginia* 23604 (DA0E3825)

Conduct a detailed cost analysis on helicopter drive systems. Objective will be to establish a baseline for drive system fabrication development and acquisition costs. Cost comparison will be made and R&D programs developed. Normal operating precedural suggestions will be made where cost savings are apparent.

Perform detailed review of the cost history of major drive train components. Review will encompass the identification of cost drivers from the establishment of requirements through development of unit production cost spares acquisition. An analysis will include comparisons of variations in individual elemental costs. Principal disciplines involved in overall component costs will be identified, and cost savings recommendations will be made. Approaches will be developed to accomplish R&D efforts directed toward reductions in life cycle costs, drive system components and assemblies.

SUPPORTED BY U.S. Dept. of Defense, Aviation Research & Development Command, Research & Technology Lab.

1.0029, AERONAUTICAL TECHNOLOGY, TECHNICAL AREA I - AERODYNAMICS TECHNOLOGY
J.L. Shipley, U.S. National Aeronautics & Space Admin., Office of Aeronautics & Space Technology, Langley Research Center, *Hampton, Virginia* 23665 (DA0E3551)

Develop and demonstrate the technology, techniques, and design criteria necessary to provide adequate performance, stability, control, and handling qualities for the Army's rotary wing missions, and to improve the capability to analyze and predict these characteristics in existing and future aircraft. This technology is necessary to increase aircraft availability and survivability as well as provide for improved operational effectiveness and mission capability of Army aviation systems.

Objectives are accomplished by conducting analytical, ground-based simulations, whirl tower, wind tunnel, and flight test investigations in joint participation with NASA. Research will include wind tunnel and flight test of advanced air-foils and tip shapes, design of a V-tail configuration and improvements in forward flight performance analysis. Acoustics research will be conducted to identify noise sources, improved prediction capability, and development of methods for reducing noise without performance degradation. The all-weather terminal area operations program will be continued to develop criteria with respect to handling qualities, control, and display requirements. Analysis and flight tests will be conducted to continue improvement in the area of helicopter stability derivative extraction. In addition evaluation of the dape tip on the AH-1 IMRB techniques will be conducted through flight tests.

SUPPORTED BY U.S. Dept. of Defense, Aviation Systems Command, Air Mobility Research & Development Lab.

1.0030, LIMITING PERFORMANCE OF NONLINEAR SYSTEMS WITH APPLICATIONS TO HELICOPTER VIBRATION CONTROL PROBLEMS 16091-E
W.D. Pilkey, University of Virginia, School of Engineering & Applied Science, Dept. of Aerospace Engineering, *Garrett Hall, Charlottesville, Virginia* 22903 (DA0G8947; DAAG29-79-G-0015)

To study helicopter vibration control systems both active and passive including rotor isolators. Relevance - this research is very relevant in helicopter technology, also relevant to a variety of other dynamic systems such as engines.

An analytical procedure is set up so that some index of performance is extremized subject to some constraint functions. Mathematical programming techniques are used to effect a solution.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

1.0031, RAPID EVALUATION OF PROPULSION SYSTEM INSTALLATION EFFECTS
W.H. Ball, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF140340; F33615-77-C-3085)

It is necessary in the evaluation of any advanced technology application to military aircraft or the assessment of the value of advanced aircraft to be able to predict aircraft performance with accuracy. In order for such a prediction method to be effective, it must be rapid in order to keep up with the large volume of data required for an effective study. The objective of this effort is to improve the efficiency and accuracy of the current propulsion installation procedure. With this method, more reliable estimates may be made of the performance characteristics of conceptual flight vehicles.

The approach to be followed is to develop modifications to the PIPS calculation program to enable it to interactively use a stored library of inlet and nozzle/aftbody maps, and to determine the optimum scheduling between bypass and spillage drag. In addition, a procedure will be developed to determine the effects on inlet and aftbody performance of configuration changes that are not represented in the basic stored inlet maps.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

1.0032, DESIGN METHODS FOR SHOCK-FREE CASCADES WITH FUTURE APPLICATION TO TURBOMACHINERY COMPONENTS
A.R. Seebass, University of Washington, Graduate School, *Seattle, Washington* 98105 (NSG 3261)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

CHEMISTRY AND MATERIALS

Includes Chemistry and Materials (general); Composite Materials; Inorganic and Physical Chemistry; Metallic Materials; Nonmetallic Materials; and Propellants and Fuels.

3.0001, INVESTIGATION OF REINFORCED PLASTICS FOR NAVAL AIRCRAFT ELECTROMAGNETIC WINDOWS
V.A. Chase, General Dynamics Corp., Convair Division, *P.O. Box 1950, San Diego, California* 92112 (DN590146; N00019-76-C-0405)

Investigation of reinforced plastics for naval aircraft electromagnetic windows. Develop composites for improved performance in aircraft radomes and antenna covers. Work requires experience in the fields of composite materials, particularly in polymer modification, and in electromagnetic window design and fabrication.

Investigate reactive monomers such as triallyl cyanurate for improving the strength and elevated temperature properties of polybutadiene laminates. Develop fabrication processing procedures to obtain maximum properties.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

3.0002, SYNTHESIS OF PHOSPHATRIAZINES FOR POTENTIAL HIGH-TEMPERATURE FLUIDS APPLICATIONS
K.L. Paciorek, Ultrasystems Inc., *2400 Michel Dr., Irvine, California* 92715 (DF043280; F44620-76-C-0065)

Air Force function - future Air Force flight operations require better environment-resistant materials. Deficiency - a need exists for fluids and lubricants with better high-temperature

stability than presently existing materials. Objective - the objective of this research is to synthesize and characterize new polyfluorinated compounds with high thermal and oxidative stability. How work contributes - the work will determine the usefulness of the newly synthesized materials in high-temperature applications.

The proposed research investigation is concerned primarily with the synthesis of monophospha- and diphospha-S-triazine systems with some effort to be extended on the diphospha-8-membered ring compositions. The triazines are to contain perfluoroalkyl substituents and connecting chains, perfluoroalkylether substituents and connecting groups as well as hybrids thereof. Phenyl groups are contemplated as the substituents on phosphorus. To develop fluids exhibiting the optimum characteristics, tailoring of properties via substituent and ring atom selection will be carried out.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0003, LASER FLUORESCENCE STUDIES OF THE CHEMICAL INTERACTIONS OF SODIUM SPECIES WITH SULFUR-BEARING FUELS

M. Steinberg, University of California, Santa Barbara Campus, School of Engineering, Dept. of Chemical & Nuclear Engineering, *Santa Barbara, California* 93106 (NSG 3256)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

3.0004, ANALYSIS OF AIRCRAFT ENGINE OIL SAMPLES BY NEUTRON ACTIVATION TECHNIQUES

T.A. Menard, U.S. Dept. of Defense, Air Force, Air Force Academy, Physics Dept., *Colorado Springs, Colorado* 80840 (DF282210)

A continuation of the feasibility study conducted during 1976, this study will attempt to determine the feasibility of using a (Cf252) neutron source for activating aircraft oil samples as a means of supplementing the USAF spectroscopic oil analysis program. This project will determine if the neutron activation method is faster and/or more accurate than presently used methods of determining trace contaminates in oil.

(a) A Cf252 source will be obtained on loan from ERDA. (b) Calibration standards will be prepared and curves established for the 13 elements of interest in oil analysis. The approach will be to determine the optimum method for observing each element in order to obtain the lower limit in ppm plus or minus 10 percent. (c) Aircraft engine oil samples will be activated and the trace metal concentrations determined using the calibration curves. By comparing these results with those obtained by the soap methods a conclusion can be drawn concerning the value of this method in relation to the established methods.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Frank J. Seiler Research Lab.

3.0005, FATIGUE CRACK PROPAGATION IN TITANIUM ALLOYS

A.J. McEvily, University of Connecticut, Storrs Campus, School of Engineering, Dept. of Metallurgy, *Box U-37, Storrs, Connecticut* 06268 (DF039080; AFOSR-74-2703)

AF function - to improve what is known about structural materials used in Air Force flight systems so that current and new systems might achieve better reliability and prolonged service life. Deficiency - not enough is known about the interrelation between macroscopic and microscopic events concerning the fatigue process, especially in selected titanium alloys. Results from this research study will serve to enhance the understanding about fatigue fracture initiation, propagation and retardation. Objective - this work intends to investigate the specific effects of overload in a systematic study of the different parameters involving retardation of critical-sized linear crack defects. How work contributes - through an extension of scientific information of crack mobility, a better method of design analyses should serve to improve Air Force flight systems reliability and serviceability.

Experimentally, the proposed research will continue to use Ti-6Al-4V as a control standard for crack growth studies with detailed comparisons to other titanium alloys of greater relevance to Air Force needs and priorities, e.g. IMI 685 and 5522S. Appropriate tests are to be made in air and vacuum at temperatures of ambient and about 900 degrees F(482 degrees C).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0006, DETERMINATION OF LOAD SEQUENCE EFFECTS ON THE DEGRADATION AND FAILURE OF COMPOSITE MATERIALS

J.N. Yang, George Washington University, Graduate School, *901 23rd St. N.W., Washington, District of Columbia* 20037 (NSG 1604)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

3.0007, NAVAL VEH. & MAT. SUPP. TECH - RES. ON MICROSTRUCTURE - FRACTURE CHARACTERISTICS OF HIGH-STRENGTH NAVAL METALS & ALLOYS

D.A. Meyn, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN620107)

Microscopic cracking mechanisms which cause slow crack growth in advanced military aircraft and ship components are identified by discussions with failure analysts close to the fleet, and studied in the laboratory in efforts to better understand and prevent these failures. Such studies contribute to a better understanding of the basic mechanisms of cracking, selection of better materials, and the designing of standard preventive tests.

The interdependent nature of the stress, microstructure, and environment on the microscopic scale, and how these change with time and crack growth are studied by observing the crack tip and fracture surfaces at high magnifications in electron microscopes, after the cracks have been grown under controlled laboratory conditions.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

3.0008, MICROBIAL DETERIORATION OF SYNTHETIC FUELS

R.A. Neihof, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880092)

To assess the susceptibility of jet fuels derived from oil shale, tar sands and coal to infestation and deterioration by microorganisms. To identify fuel constituents contributing to microbial growth promotion and to examine ways of preventing such growth.

Test units will be set up containing two phases - a synthetic fuel and a fresh or sea water medium. Bacteria, fungi and yeast known to be prevalent in fuel tanks will be used for inoculation. The test systems will be monitored during a period of a year or more to determine microbial activity and changes in the chemical and physical properties of the fuels. The appearance of any unusual microbial growth stimulation will be traced to the fuel constituents responsible.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center

3.0009, MECHANISMS OF DEVITRIFICATION OF GRAIN BOUNDARY GLASSY PHASES IN SILICON NITRIDE MATERIALS

L.L. Hench, State University System of Florida, University of Florida, School of Engineering, Dept. of Metallurgical Materials, *220 Black Hall, Gainesville, Florida* 32611 (NSG 3254)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

3.0010, DELAMINATION AND THE EFFECT OF SURFACE INHOMOGENEITIES IN LAMINATED COMPOSITE MATERIALS

L.M. Brock, University of Kentucky, School of Engineering, Dept. of Engineering Mechanics, *Limestone & Euclid, Lexington, Kentucky* 40506 (ENG7811773)

Many naturally occurring and engineered structures can be modelled as a laminated composite material. Examples range from the earth's crust to the currently popular fiber epoxy-matrix composites being developed for aerospace structures. Thus, the prediction of delamination in composite materials has implications ranging from structural integrity to earthquake prediction.

The aim of this research project is to predict the delamination of laminated composite materials, as well as the effect of thin surface layer inhomogeneities, with particular attention being given to currently important problems. Specific questions being addressed, include: (1) The effect of flaw surface conditions and the nature of the bonding on flaw extension, (2) the effect of thin layer surface inhomogeneities on dynamic surface response, crack propagation, and interface flaw extension, and (3) the difference in flaw extension due to initiation from either a pre-existing flaw or a bonding irregularity.

A set of wave propagation experiments is designed to assess the relative importance of various surface layers upon the dynamic response of a material.

SUPPORTED BY U.S. National Science Foundation, Div. of Engineering

3.0011, EFFECTS OF SURFACE MORPHOLOGY AND CHEMICAL COMPOSITION ON THE DURABILITY OF ADHESIVELY BONDED ALUMINUM STRUCTURES

J.M. Chen, Martin Marietta Corp., *1450 S. Rolling Rd., Baltimore, Maryland* 21227 (DF053000; F49620-78-C-0097)

AF function - the use of adhesively bonded aluminum structures in AF aircraft of all types is continually increasing, not only in quantity, but also in the structural importance of the bonded components. Deficiency - the reliability of adhesively-bonded aluminum structures for aerospace applications is presently limited by their inability to withstand adverse environments. Objective - improve the reliability of adhesively bonded aluminum structures. How work contributes - by obtaining a basic understanding of the relationships between surface properties and environmental durability, significant improvements can be made in bonded aluminum structures.

A systematic study will be performed of the surface properties of aluminum adherends, particularly the physical morphology, chemical composition and crystallographic structure, before and after environmental exposure and with and without bond formation. With a sufficient understanding of the mechanisms involved in adhesion and durability, it will be possible to recommend methods of surface preparation and bond curing procedures to improve long-term durability. Studies of the physical and chemical properties of Al alloy adherend surfaces, will include using advanced techniques of stereo transmission electron microscopy and Auger electron microscopy.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0012, RESPONSE OF HEATED MATERIALS TO SHOCK LOADING (X-RAY SHOCK)

G.E. Hauver, U.S. Dept. of Defense, Army, Armament Research & Development Command, Terminal Ballistic Div., *Aberdeen Proving Ground, Maryland* 21005 (DA0J4541)

The objective is to investigate the response of heated aerospace materials to shock loading. Materials subjected to a radiation environment can be heated to a significant depth below the exposed surface. The shock response and subsequent failure of these heated materials is a concern in the evaluation of fratricide and lethality.

The analytical approach will treat shock propagation in one-dimensional specimens of an ablator material, an aluminum alloy, and an epoxy-bonded system consisting of the two materials. The analysis of shock propagation in systems containing heated and unheated aluminum will be performed. An attempt will be made to develop a fracture and spall model which is temperature dependent for the aluminum alloy. Gas gun experiments on the individual materials and the bonded system will provide input to the analytical treatment and also assess the accuracy with which the analytical treatment predicts physical behavior. It is planned to perform uniaxial strain experiments at stress levels up to 10 kbar to investigate the hugoniot and unloading characteristics of the ablator, as well as attenuation and dispersion effects. The dynamic yield stress of the aluminum alloy will be measured as a function of temperature. The characteristics of reflected and transmitted stress pulses in the bonded system will be investigated for comparison with computed pulses.

SUPPORTED BY U.S. Dept. of Defense, Armament Research & Development Command, Ballistic Research Lab.

3.0013, RARE EARTH LASER MATERIALS

A. Linz, Massachusetts Inst. of Technology, Crystal Physics Lab., *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DN880114)

Growth, fabrication and characterization of various fluoride and oxide host crystals with one or more trivalent rare earth ions as dopants or major constituents.

Host crystals with various dopants to be selected by contract monitor will be grown or purchased. Samples of appropriate size will be fabricated and tested and supplied to NRL.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

3.0014, FRACTURE AND FATIGUE OF BI-MATERIALS

J.W. MAR, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF037950; F44620-74-C-0023)

AF function - Air Force advanced aerospace vehicles require improved structural efficiency and durability. Opportunity - in order for the Air Force to exploit the application of composite materials for primary structures knowledge of their fracture and fatigue behavior is necessary. Objective - the objective of this research is 1) to develop an understanding of the compression-compression fatigue behavior of graphite-epoxy laminates, and 2) investigate fracture behavior, notch sensitivity and applicability of linear fracture mechanics to composite laminates. How work contributes - research will contribute to basic understanding of composite structural materials for aerospace vehicle applications.

Experiments will be conducted which investigate both the fracture and fatigue of composite laminates. Specimens to be used will be both defect-free and prenotched to examine the influence of stress raisers. Experiments will study the influence of laminate cross-ply angle on the failure behavior of the specimens. In addition, variations in the laminate stacking sequence will be used to assess the influence of interlaminar stresses on damage initiation and growth process.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0015, STRESS CORROSION AND HYDROGEN EMBRITTLEMENT OF ESR AND MARAGING STEELS FOR MISSILES

W.F. Czyrklis, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0E4750)

Determine and evaluate factors affecting the stress corrosion characteristics and mechanical properties of ultrahigh-strength alloys such as ESR, TRIP, and maraging steels for missile aircraft and armor applications. In addition, the potential deleterious effects of conventional surface treatments and hydrogen embrittlement will be investigated. Maraging steels are currently used in components such as rocket motor cases, drive shafts, landing gear parts, pins, and hinges. ESR steels have demonstrated potential as vehicular armor.

Hydrogen diffusion characteristics of maraging steels and ESR 4340-modified will be determined by electropermeation test techniques and the results correlated with stress corrosion

cracking, mechanical properties, microstructure, surface treatments, sulfur/phosphorous content and susceptibility to hydrogen-assisted catastrophic (HAC) failure. Modes of SCC failure will be determined by examination of fracture surfaces employing replica electron microscopy techniques.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0016, COATINGS FOR UPGRADED PERFORMANCE OF GAS TURBINE ALLOYS

M. Levy, U.S. Dept. of Defense, Army, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center, *Watertown, Massachusetts* 02172 (DA0B4762)

To develop improved high-temperature coatings for nickel-base superalloys and columbium alloys for application in the compressor and hot turbine section of gas turbine engines in order to upgrade performance through higher turbine inlet temperatures and increases in time-between-overhaul. Coatings to be developed include: a) sulfidation-resistant coatings for superalloys (e.g., airfoils), and b) oxidation-sulfidation-resistant coatings for columbium alloys (e.g., blades and vanes).

A) Oxidation and sulfidation-resistant mcraly coatings for superalloys will be further developed utilizing less costly electrophoresis and plasma spraying plus diffusion treatments. Coating parameters will be optimized to produce minimum substrate embrittlement by controlled diffusion. Performance in the dynamic hot corrosion test rig will be compared to current overlay coatings. b) Oxidation resistant diffusion coatings based on various combinations of Ti, V, W, Mo, and Si will be applied to Cb alloys by electrophoresis. The effects of layer composition, diffusion temperature, and coating thickness on oxidation and sulfidation resistance (isothermal and cyclic) will be evaluated.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Materials & Mechanics Research Center

3.0017, EVALUATION OF THE FUEL/WATER EMULSION CONCEPT FOR SMOKE REDUCTION

A.F. Klarman, U.S. Dept. of Defense, Navy, Naval Air Propulsion Test Center, *Trenton, New Jersey* 08628 (DN796817)

Determine the effects of a fuel/water emulsion of jet engine fuel control and engine performance. Evaluate the feasibility of using the fuel/water emulsion concept for test cell exhaust stack smoke plume reduction.

Subject a gas turbine engine and fuel control to a cycle which includes a two-hour fuel/water test followed by a purge with clean fuel and a 22-hour 'soak' with clean fuel. Repeat this cycle five times. Compare performance to model specification. Disassemble and inspect the fuel control for corrosion. Monitor engine exhaust pollutants at the engine tailpipe with a cruciform probe (CO_2, CO, HC, NOx, smoke) and with a single point probe (particulates) and at the test cell exhaust stack (visual opacity). During two one-hour cycles perform a parametric evaluation of the fuel/water emulsion water concentration.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Material Command

3.0018, FATIGUE CRACK NUCLEATION AND PROPAGATION IN ALPHA-BETA TITANIUM ALLOYS

H. Margolin, Polytechnic Inst. of New York, Brooklyn Campus, School of Science & Engineering, Dept. of Metallurgical Engin, *333 Jay St., Brooklyn, New York* 11201 (DF040010; AFOSR-75-2774)

AF function - the longevity, reliability and safety of aerospace structures are related to the fatigue properties of the structural materials used. In fact, the fatigue properties of structural materials often limit their application. Opportunity - thus, it is important to understand the mechanisms of fatigue and especially the metallurgical means by which fatigue resistance may be improved. Systematic studies of fatigue crack initiation and propagation in alpha-beta titanium alloys are of great interest to the Air Force and would make a useful contribution to future development of engineering alloys. Objective -this research will determine the relationship between fatigue properties and microstructure of two-phase (alpha-beta) titanium alloys. Specifically, the Ti-Mn system will be used as a model system for alloys consisting of two ductile phases. How work contributes - alloy composition and heat treatment can be used to vary the volume fraction and morphology of the phases present, and thus, by this study, the most desired microstructures for fatigue resistance can be determined.

Fatigue crack initiation and propagation characteristics will be related to microstructural features such as phases present, particle size and distribution, and dislocation densities. Monotonic and cyclic stress-strain curves will be determined for each alloy composition to aid in interpretation of fatigue data.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0019, DEVELOPMENT OF FT MATERIALS

A.F. Armington, U.S. Dept. of Defense, Air Force, Rome Air Development Center, *Griffiss Air Force Base, Rome, New York* 13441 (DF903480)

The objective of this effort is to improve quality of resonator materials. Presently used quartz resonators lack radiation hardening and long-term stability. Fabrication of resonators from this material should result in improved radiation hardening and frequency stability for use in satellites and other Air Force systems.

Crystals of sufficient size for 5 megaHerz resonators will be grown by hydrothermal technique using information obtained from JOCAS 2306J104. Purification of quartz by electrolysis will be investigated.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

3.0020, CONTROLLED STRUCTURE ADHESIVE INTERPHASES

J.B. Lando, Case Western Reserve University, School of Engineering, Dept. of Macromolecular Science, *University Cir., Cleveland, Ohio* 44106 (DF053160; AFOSR-78-3692)

AF function - the AF seeks to improve durability and reliability of composite structures, since these materials offer light weight and reduced manufacturing costs when incorporated into advanced airframe structures. Deficiency - despite many years of intensive study, the nature of the adhesion interphase (in composite materials) and its deterioration by environmental attack, notably by water, has eluded elucidation. The use of adhesion promoters for composite systems consequently has not obtained any firm basis for prediction or optimization. Objective - seek greater understanding of molecular processes involved. How work contributes - to determine adhesion-related properties of monolayers and multilayers of coupling agents formed with known and controlled compositions and structural packing configurations upon well-characterized glass, pyrolytic graphite and resin substrates.

Variations in the composition of the coupling agent and its mixtures and in the technique of layer deposition will be employed to introduce specific layer sequence structures and defect/void regions in the interphase. The interphase will be characterized by electron microscopy, a unique micromechanical tensile test, and other techniques as deemed appropriate to establish the nature and perfection of interphase structures and component interactions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0021, NITRIDATION KINETICS AND REACTION SINTERING OF SILICON NITRIDE

H.C. Yeh, Cleveland State University, School of Engineering, Dept. of Metallurgical Engineering, *1983 E. 24th, Cleveland, Ohio* 44115 (NSG 3259)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

3.0022, FRACTURE BEHAVIOR OF BORON ALUMINUM AND GRAPHITE POLYMIDE COMPOSITES AT ROOM AND ELEVATED TEMPERATURES
J. Awerbuch, Drexel University, School of Engineering, Dept. of Mechanical Engineering, *32nd & Chestnut Sts., Philadelphia, Pennsylvania* 19104 (NSG 1606)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

3.0023, STRUCTURE-FUNCTION STUDIES ON THERMOPHILIC GLUTAMINE SYNTHETASE
F.C. Wedler, Pennsylvania State University, University Park Campus, Graduate School, *205 Kern Graduate Bldg., University Park, Pennsylvania* 16802 (NSG 7515)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

3.0024, DEVELOPMENT AND PRACTICAL APPLICATION OF THE THEORY OF MATERIALS
J.R. VanWazer, Vanderbilt University, School of Arts & Sciences, Dept. of Chemistry, *21st Ave. S., Nashville, Tennessee* 37232 (DF046680; AFOSR-77-3145)

AF function - Air Force flight operations have continuing needs for improved structural and environment-resistant materials. Deficiency - a need exists for methods to predict the best approaches for making new materials. Objective - the research deals with the development and practical application of the theory of materials to problems of importance to the Air Force. How work contributes - the work will provide a basis for the synthesis of desirable new materials without having to depend entirely on trial-and-error experimental procedures.

The NOCOR procedure for carrying out ab initio LCAO-MO-SCF calculations of atomic and molecular valence electronic structure will be applied to several new kinds of problems and also further improved in precision. The application of this method to the study of bonding and other properties, particularly in molecular systems containing heavy elements, will be continued and expanded. The accuracy and range of application of valence-electron methods in general will be studied and compared with other techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

3.0025, AIR CUSHION VEHICLE SKIRT MATERIAL INVESTIGATION
P.D. Touchet, U.S. Dept. of Defense, Army, Mobility Equipment Research & Development Command, Marine Div., *Fort Belvoir, Virginia* 22060 (DA0N3627)

To extend the life and associated cost of these components which drag over land and sea, it is planned to investigate materials and processes more suitable to the severe wear they must endure. Current life is approximately 350 hours of operation. A target life expectancy will be 600 hours.

It is planned to determine results of prior efforts by both the United States and foreign investigators, including the National Research Council, on material application to air cushion technology. Then using this command's expertise in fabrics for oil, inflatable boats, etc., applying that experience to realize the above technical objective by physically testing on the only active air cushion vehicle in the United States Government, the LACV-30. (Based on the approach by the US Navy and Bell Aerospace to use a composite material of rubber coating on nylon, MERADCOM plans to investigate the use of a thermoplastic urethane with and without a nylon-backed composite. Three experimental cushion fingers of each of three MERADCOM composite materials will be procured and installed on the LACV-30-2. It is planned to log 300-400 hours of wear on these experimental materials and then evaluate. This evaluation is planned for September 1979.)

SUPPORTED BY U.S. Dept. of Defense, Mobility Equipment Research & Development Command, Marine Div.

ENGINEERING

Includes Engineering (general); Communications; Electronics and Electrical Engineering; Fluid Mechanics and Heat Transfer; Instrumentation and Photography; Lasers and Masers; Mechanical Engineering; Quality Assurance and Reliability; and Structural Mechanics. For Related Information See Also Physics.

4.0001, SOLID-STATE SWITCH DESIGN FOR LARGE SPACE STRUCTURE TECHNOLOGY
W.D. Raburn, University of Alabama, Graduate School, *P.O. Box 2846, University, Alabama* 35486 (NAS 8-33430)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

4.0002, INTEGRATED SINGLE-FAMILY SOLAR HOT WATER FLOW-THROUGH SYSTEM USING TWO STORAGE TANKS, CASCADE CONTROL SYSTEM (ABBREV)
T. Honikman, Elcam Inc., *Santa Barbara, California* 93111 (0AS8-32245)

Development of an integrated single-family solar hot water flow-through system using two storage tanks with a cascade control system and a collector dump valve for freeze protection.

Elcam, Inc., will design, develop and deliver two identical single-family solar assisted hot water systems to two sites. The hot water systems use flat-plate, liquid heating collectors with a non-selective coating and a single glazing. Cascade control system will be used. The two sites for installation are Phoenix, AZ, and San Diego, CA. Marshall Space Flight Center will monitor equipment performance. (DOE/CS-0010)

SUPPORTED BY U.S. Dept. of Energy, Office of Conservation & Solar Applications, Div. of Solar Applications

4.0003, CALCULATION OF SEPARATED FLOW ABOUT A GENERAL BODY IN A NON-UNIFORM ONSET FLOW, 13690-EX
J.L. Hess, McDonnell Douglas Corp., *3855 Lakewood Blvd., Long Beach, California* 90808 (DA0E9040; DAAG29 76 C 0021)

To analyze the flow about a general three-dimensional body immersed in a non-uniform onset flow with the aim of predicting the aerodynamic pressures and forces acting on the body. The proposed investigation is directly relevant to the problems of missile separation on helicopters being studied at both MICOM and AMRDL-Eustis Directorate and is also relevant to the problem of gusts and round-to-round and launcher-to-round interferences on missiles.

Existing general surface singularity methods for calculating potential flow with uniform onset flow will be generalized to account for non-uniform onset flow conditions and possibilities of separated flow regions. Separated flow regions will be treated by eiyher wake shape being input to calculation or having wake shape determined as part of an iterative computation.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

4.0004, HIGH-VOLTAGE DC GENERATOR SYSTEM
F. Echolos, Signal Companies Inc., Air Research Manfacturing Co, *2525 W. 190th St., Torrance, California* 90509 (DN781391; N62269-76-C-0223)

To develop a HVDC generator system incorporating design techniques for reduction of ripple voltage, transient surge voltage and rectifier commutation spikes. This contract supports work unit ZA601, Agency Accession No. DN681080.

To review exploratory development design techniques that have proven feasible and incorporate them in a total generator regulator system design.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0005, NUMERICAL SIMULATION OF THE TURBULENT SHEAR LAYER USING THE VORTEX-IN-CELL METHOD

O. Buneman, Stanford University, Inst. for Plasma Research, Dept. of Electrical Engineering, *Stanford, California* 94305 (NCA 2-745906)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

4.0006, NON-INTERFERENCE LASER-BASED DIAGNOSTIC TECHNIQUES APPLIED TO TURBULENT COMBUSTION DYNAMIC PHENOMENA

R.K. Hanson, Stanford University, School of Engineering, Dept. of Mechanical Engineering, *Stanford, California* 94305 (DF051150; F49620-78-C-0026)

AF function - advanced diagnostic techniques, advanced airbreathing engines, weapon delivery and defense. Deficiency - inability to obtain reliable measurement of important parameters in turbulent reacting flows in practical hostile combustion environment via present-day measuring and diagnostic techniques, inability to reliably evaluate combustion models. Objective - to develop more sensitive selective, precise, reliable and rapid diagnostic methods for measuring important parameters in jet engine reacting flow environment. To determine feasibility of using tunable diode laser and other laser-based diagnostic techniques for obtaining reaction kinetic-turbulence coupling effects, fundamental combustion gas spectroscopic parameters and high spacial and time resolution temperature species concentration and velocity measurements in practical combustion environments, to determine capabilities and limitations of these techniques as laboratory diagnostic tools, to provide reliable experimental data to the combustion modeler. How work contributes - will provide additional understanding and reliable data to permit realistic evaluation of analytic models of complex reacting flows, will help reduce development time and cost of airbreathing propulsion systems, will permit evaluation of capabilities and limitations of various diagnostic methods, will aid in development of improved or novel new in-situ nondisturbing techniques for accurately measuring turbulent reacting flow parameters.

Tunable diode laser techniques for species concentration and temperature measurements under steady and fluctuating combustion conditions will be developed and applied. Experiments will be conducted in flat-flame burner. Alternative schemes for laser modulation and data-handling will be evaluated in order to optimize the experimental technique, particularly with regard to minimizing the time required to complete the measurement. In addition, coupling between fluid dynamics and reaction kinetics in a two-dimensional turbulent reacting shear layer will be studied. Advanced laser diagnostics, including tunable diode lasers and laser anemometry, will be employed to characterize the flow field structure. The experimental data will be used to determine the influence of fluid dynamics on reaction rates. To extend existing combustion diagnostic capabilities, several point-measuring schemes will be evaluated. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0007, MEASUREMENT OF THE TURBULENCE COMPONENTS IN A FILM-COOLED BOUNDARY LAYER ON A CURVED SURFACE

R.J. Moffat, Stanford University, School of Engineering, Dept. of Mechanical Engineering, *Stanford, California* 94305 (DF052250; AFOSR-78-3597)

AF function - advanced turbomachinery. Opportunity - improvement in present methods for predicting heat transfer and aerodynamic losses on cooled gas turbine blades. Objective - document the streamwise development of the turbulence field in the boundary layer of a heated, convex surface having discrete hole film cooling. How work contributes -would provide experimental data useful for determining validity of predictive methods presently used to account for turbine blade cooling effects.

Data will be taken at several transverse stations spanning the pattern of the injection holes and at several streamwise locations. At each location traverses will be made through the boundary layer recording, as a function of the distance from the wall, mean and fluctuating properties of the flow field. Test conditions will span a range of ratios of boundary layer thickness to radius of curvature and a range of blowing velocities.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0008, BOUNDARY LAYER TRANSITION

J. Laufer, University of Southern California, School of Engineering, Dept. of Aerospace Engineering, *3551 University Ave., Los Angeles, California* 90007 (DF052070; F49620-78-C-0060)

AF function - advanced aerospace vehicles. Opportunity - to gain insight into the pressure and velocity feedback mechanisms effects on the stability of jet flows. Objective - experimentally investigate the causes and effects of the resonance conditions of impinging jets. How work contributes - all fluid flows transfer energy and momentum to or from flows of different velocity, pressure and temperature through convective-shear flow mechanisms. In the past this mechanism has been viewed as a random small eddy, i.e. Prandtl's mixing length, or a molecular diffusivity mechanism. Within the last decade or so large vortical structures with the shear flow have been observed and documented; however, the relationship or existence of these large structures in fully turbulent, high-velocity boundary or free shear flows is not known. This research will provide needed information and diagnostic techniques to further our understanding of how pressure and velocity feedback mechanisms affect the stability of the flow field, create the large-scale structures of vorticity and control their behavior. It will also contribute data on the interaction of these flow field effects and solid boundaries. This information will provide new concepts and understanding for the design of future aerospace vehicles.

Experimental configurations of an axisymmetrical jet (heated and unheated) impinging on a large flat plate normal to the axis of the jet will be investigated in a anechoic chamber. Conditional sampling data of pressure fluctuations, temperature fluctuation and heat transfer rates on the plate along with the far field noise will be measured and analyzed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0009, GPS/SANSO MEASUREMENT ADVISORY SERVICES

D. Halford, U.S. Dept. of Commerce, National Bureau of Standards, *325 S. Broadway, Boulder, Colorado* 80302 (2765489)

PROJECT OBJECTIVE: The Electromagnetics Division is to provide advise and consultation to the Air Force Space and Missile Systems Organization and its contractors regarding electromagnetic metrology in support of the Global Positioning System (GPS) and in support of Camp Parks Radiometric Test Station (CPRTS). SAMSO will use the Navigation Signal Calibration Test Set (NSCTS) at CPRIS to measure the technical performance of one Navigation Technology Satellite (NTS) and six NDS.

PROJECT APPROACH: Support measurements at CPRIS of each of six GPS satellites to be launched in FY 78. Identify unmet needs for standards and metrology at CPRTS. Provide advice and consultation at formal meetings of the GPS program process. Prepare plan for on-site calibration of 60-foot radiometric antenna at CPRTS and for eventual self-sufficiency via use of starflux by CPRTS in its antenna calibrations.

PRIOR YEAR ACCOMPLISHMENTS: Measured analog performance parameters of GPS satellite NDS-2. Finished review and acceptance of GPS calibration receiver.

SUPPORTED BY U.S. Dept. of Commerce, National Bureau of Standards

4.0010, ELECTROMAGNETIC SUSCEPTIBILITY STUDY OF METALLIC AND COMPOSITE ENCLOSURES AND ELECTRONIC CIRCUITS

D.C. Chang, University of Colorado, Boulder Campus, School of Engineering & Applied Science, Dept. of Electrical Engineering, *1200 University Ave., Boulder, Colorado* 80302 (DN675207; N00014-76-C-0318)

Electromagnetic interference and susceptibility of electronic circuits to external electromagnetic fields are problems of considerable interest to the Navy due to the high-level electromagnetic fields typically present on ships. Electromagnetic penetration through composites is of concern due to their increasing use in military aircraft. The objective of this research is to develop analytical and theoretical methods to treat these problems.

The penetration of electromagnetic fields through apertures and into electronic circuits is treated theoretically using an equivalent circuit approach where the aperture coupling is treated as lumped circuit elements, and the enclosure as an antenna. Cylinders of diameter of the order of a wavelength are treated using a Wiener-Hopf procedure. Penetration through composites is treated by solving for the surface impedance of a planar periodic structure.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0011, INVESTIGATION TO CORRECT THE HIGH-TEMPERATURE PROBLEMS AND DEVELOPMENT OF ELECTROSTATIC FIELD SENSOR FOR HELOS P-STATIC DISCHARGER

G. Parkinson, United Technologies Corp., Sikorsky Aircraft Corp Div, *N. Main St., Stratford, Connecticut* 06602 (DN790080; N00019-77-C-0255)

To develop a no-moving-parts electrostatic field sensor to drive CH53 p-static discharger system and to correct the temperature problem in its bleed air system components.

A p-static discharger system was developed for helicopters of the CH53E fleet but the system sensor and bleed air components have not been effective. Contractor shall develop and laboratory test two prototype sensors and two manifold (discharge channels). Using CH53E operating requirements a computer analysis will be made to determine sensor design parameters. Two solid-state sensors with dual probes and two new high-temperature channels using the best insulating macor (glass) materials or equivalent will be built. Both sets of sensors and channels/manifold components will be tested in the laboratory using signals from the p-static discharger system.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0012, REFURBISH SPERRY UNIVAC 9300 SYSTEMS

R.W. White, Sperry Rand Corp., *1019 19th St. N.W., Washington, District of Columbia* 20007 (FA78NA-5073; FA161510 (TRAIS NO.))

A complete overhaul and support services are required to insure continued reliability and maintainability of seven (7) government-owned Sperry Univac manufactured 9300 systems. In addition, this procurement will provide for updating equipment to the latest engineering design change of the manufacturer, training of FAA personnel, providing a complete set, documentation, logics, manuals, handbooks and 80-column card test deck, providing qualified personnel to install and deinstall all 9300 systems and then return systems to their points of origin.

SUPPORTED BY U.S. Dept. of Transportation, Federal Aviation Admin.

4.0013, DYNAMIC RESPONSE OF PNEUMATIC TIRES WITH REFERENCE TO AIRPLANE BRAKE CONTROL

A.F. Dsouza, Illinois Inst. of Technology, School of Engineering & Physical Science, Dept. of Mechanical Engineering, *3300 S. Federal St., Chicago, Illinois* 60616 (DF050000; AFOSR-77-3447)

AF function - improvements in aeromechanical elements, critical subsystems and component of flight vehicles are necessary in order to continue the success of aerospace vehicles to perform as required. Deficiency - inadequate models exist of tire friction and wear and tire interactions with braking devices. Objective - the objective of this research is to develop kinetic and kinematic models of tire behavior during landing. How work contributes - research is ancillary to experimental research program being conducted inhouse at AFFDL.

Mathematical simulation of tire response during cross wind landings will be developed. Model will include dynamic forces and viscoelastic tire characteristics. Linear differential operator relationship between deformations and stress will be assumed. The dependence of the peak braking force on the tire properties will be investigated by parametric sensitivity analysis. Parameter optimization will be examined with respect to desirable tire characteristics.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0014, ELECTRONIC COMPONENTS FOR A/C PROPULSION CONTROLS

G. Serovy, (No Performing Organization Reported), *Iowa* (DN890074; N00019-78-M-0286)

A research study to evaluate the effect of component performance trends and propulsion system cycle variants on jet engine control system design and development.

Major aircraft engine companies will be contacted by the investigator to assist him in assessing electronic control needs for future high-temperature jet engines.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0015, LOAD DEFLECTION CHARACTERISTICS OF INFLATED STRUCTURES

J.R. Baumgarten, Iowa State University of Science & Technology, Graduate School, *Beardshear Hall, Ames, Iowa* 50010 (NSG 1605)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

4.0016, ULTRASONIC AND ACOUSTIC EMISSION DETECTION OF FATIGUE DAMAGE

R.E. Green, Johns Hopkins University, School of Engineering, Dept. of Mechanics, *34th & Charles Sts., Baltimore, Maryland* 21218 (DF043500; F44620-76-C-0081)

AF function - Air Force advanced aerospace vehicles require increased design emphasis on durability and inspectability. New techniques for nondestructive evaluation (NDE) are needed to reduce operation and maintenance costs. Deficiency - cost factor estimates for advanced Air Force systems are quite expensive and, as such, not desirable. New inspection techniques coupled with fracture mechanics analysis methods are needed to effectively reduce Air Force serviceability costs. Objective - the object of this research is to extend the state of knowledge involving ultrasonic attenuation and acoustic emission applications and their attendant correlations with hardware used in typical Air Force flight systems. How work contributes - this research contributes to the Air Force program seeking to enhance the reliability and durability of aerospace structures.

Techniques of ultrasonic attenuation and acoustic emission will be used in this research. Experimental techniques and monitoring systems will be investigated to correlate defect initiation and growth characteristics. At a later date studies will evaluate the differences that exist between laboratory specimens and actual aircraft components.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0017, ELECTRONIC INFORMATION EXCHANGE IN HUMAN FACTORS RESEARCH

T.B. Sheridan, Massachusetts Inst. of Technology, School of Engineering, Dept. of Mech Engin, 77 *Massachusetts Ave., Cambridge, Massachusetts* 02139 (IST78-06749)

The problem of defining and measuring mental workload is a critical one in complex man-machine systems such as aircraft piloting and traffic control, nuclear reactors, and various military systems where there are large risks to public safety and large concentrations of capital under the control of one or few persons. In such systems perceptual and decision demands may change

rapidly from a state of boredom when automation functions perfectly to a state of high stress and operator unreliability when automation fails.

Thirty researchers and engineers concerned with mental workload in the U.S.A., Canada, and Great Britain will employ the New Jersey Institute of Technology's facility for research on electronic information exchange to define terms and experimental questions; share knowledge of applicable theory and research; organize and critique research in progress; and draft, edit, review and publish archival papers. These papers are to be transferred to files publicly accessible by anyone through a commercial computer network, and the availability and use of this service is to be advertised throughout the broader community of interest.

SUPPORTED BY U.S. National Science Foundation, Div. of Information Science & Technology

4.0018, EFFECT OF SERVICE ENVIRONMENT ON F-15 BORON EPOXY STABILATOR

T.V. Hinkle, McDonnell Douglas Astronautics Co., *E. 411 St., St. Louis, Missouri* 63166 (DF140780; F33615-77-C-3124)

There is laboratory evidence that the mechanical properties of epoxy matrix composite materials are degraded by moisture absorption. Available data on the effects of moisture pick-up during in-service operation on aircraft components is limited. There is a need for additional information to establish a technology base from which structural life predictions can be made for composite materials. The program objective is to accomplish this by evaluating the moisture levels and strength of the horizontal stabilators on the F-15 aircraft after extended periods of service.

Two F-15 in-service stabilators that have a well-documented high-humidity environmental history will be used as test specimens for this program. The first specimen will be used to establish a base line by conducting a moisture content analysis of the stabilator in the as-received condition and compare the results with analytical methods. A series of tests will then be performed on humid-aged coupons cut from the stabilator to determine structural degradation at various moisture levels. The second F-15 stabilator will be installed on another aircraft for additional service environmental exposure and then evaluated as a part of a future program.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0019, AIR TRANSPORTABLE SHELTERS FOR COLD REGIONS

S. Flanders, U.S. Dept. of Defense, Army, Corps of Engineers, Cold Regions Research & Engineering Lab., *P.O. Box 282, Hanover, New Hampshire* 03755 (DA0D8143)

To develop criteria, generate designs and demonstrate concepts for airtransportable shelters suited to very cold regions.

By way of discussions with users and review of literature, determine the attributes which an air transportable shelter suited to very cold regions must possess. Determine the performance and short falls of alternative shelters in very cold regions. Design, fabricate and test prototype shelters with the desired attributes.

SUPPORTED BY U.S. Dept. of Defense, Corps of Engineers, Cold Regions Research & Engineering Lab.

4.0020, ANALYTICAL INVESTIGATION OF INLET INTERNAL FLOW

D.D. Knight, College of Medicine & Dentistry of New Jersey, Rutgers Medical School, School of Medicine, *Box 101, Piscataway, New Jersey* 08854 (DF141280; F33615-78-C-3008)

The objective of this effort is to develop an analytical procedure that can be used to provide a design technique applicable to air induction systems for advanced supersonic/hypersonic military aircraft. Current analytical procedures are limited in their capability to provide the detailed analysis of the inlet internal flow structure that is required for the aerothermodynamic design requirements needed. This program shall be directed towards the development of a procedure that provides the required data. This shall result in a more efficient and rapid design of the air induction system permitting improved vehicle capability.

A numerical procedure shall be employed to calculate the inviscid and viscous flow. Boundary layer bleed flow effects will also be calculated. Data generated under the high-speed inlet investigation, F33615-75-C-3072, shall be used for correlation with the theory.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0021, MULTIPLE IGNITION, NORMAL AND CATALYTIC COMBUSTION, AND QUENCHING OF FUEL-AIR MIXTURES

F.V. Bracco, Princeton University, School of Engineering & Applied Sciences, Dept. of Aerospace & Mech Science, *Box 430, Princeton, New Jersey* 08540 (DF044300; AFOSR-76-3052)

AF function - weapon delivery and defenses, transport, advanced air-breathing engines, aircraft vulnerability and survivability. Deficiency - insufficient understanding of the basic physical, chemical, and fluid dynamic processes of (1) multiple ignition, propagation, and quenching of flames in spray-air mixtures and (2) of ignition, stability, and efficiency of catalytic combustion. Lack of guidelines for predicting potential flame/detonation quenching techniques and catalytic combustor performance and for solution of existing combustor difficulties. Objective - to clarify the relative importance, and to formulate realistic analytical representation of (1) the mechanisms of multiple ignition by hot metal particles, flame propagation and quenching in fuel-air sprays occurring in air-breathing propulsion system dry bays and fuel tanks, and (2) homogeneous, heterogeneous kinetics and transport processes in catalytic combustion phenomena associated with advanced air-breathing combustion systems. How work contributes - will provide additional understanding and needed realistic analytical modeling of multiple ignition, and flame propagation and attenuation through airfoil sprays and of homogeneous and heterogeneous high-temperature catalytic combustion processes not now available. Will contribute to establishing realistic guidelines and techniques for minimizing ignition probability and maximizing flame quenching and attenuation and for the design of efficient, stable, jet engine catalytic combustors.

Theoretical and experimental studies will be carried out of basic fluid dynamic, physical and chemical processes of catalytic combustion. Relative importance will be determined of surface physical and chemical effects, gas chemical kinetics and diffusion for various catalysts, fuels, operating conditions and geometrical configurations of monolytic (honeycomb) and packed bed catalysts over a range of operating conditions (e.g., pressure, inlet and exit temperatures, inlet velocity, fuel-air ratio) characteristics of advanced air-breathing propulsion engines. Catalysts studied will include noble metals, transition metal oxides, rare earth oxides, and other potential candidates for advanced catalytic combustors. Fuels used will include methane, propane and higher hydrocarbons. Measurements will be made of bulk velocity, temperature, pressure and exhaust gas composition and of composition within the reactive boundary. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0022, BOUNDARY LAYER SEPARATION FROM A SLENDER BODY AT HIGH ANGLES OF ATTACK

C.E. Przirembel, Rutgers the State University of New Jersey, New Brunswick Campus, School of Engineering, Dept. of Aerospace Engineering, *Old Queens Bldg., New Brunswick, New Jersey* 08903 (DF048210; AFOSR-77-3300)

AF function - advanced aerospace vehicles. Opportunity - improve analytical methods used to calculate aerodynamic forces and moments for slender bodies at high angle of attack. Objective - improve the current understanding of the complex three-dimensional separation/free-vortex shedding problem, which characterizes the flow field in the vicinity of a slender body at large angles of attack. How work contributes - will assist in a rational modification of existing analytical calculations of aerodynamic forces and moments for slender bodies at high angles of attack.

Existing experimental data, which include surface pressure distributions, and force and moment measurements for slender bodies in high Reynolds number flows will be analyzed using existing turbulent boundary layer separation criteria. The calculated axial distribution of the two primary separation lines will then be investigated by comparison with the calculated axial distribution of the side force.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0023, MOBILE ELECTRIC POWER PLANT DRIVE SYSTEM

W. Ueliner, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, *Lakehurst, New Jersey* 08733 (DN896007)

To design and test a drive system to be installed on a mobile electric power plant. Once designed and tested, the new system will replace existing drive systems on all new Navy purchases.

(a) Perform a study to determine the various methods of ground propulsion, (b) from study, determine cost and configuration of drive systems to be used on mobile electric power plant, (c) design and build drive system, (d) install and evaluate breadboard, (e) report on conclusions and make recommendations.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0024, V/STOL - SHIP INTERFACE SYSTEMS

H. Fluk, U.S. Dept. of Defense, Navy, Naval Air Engineering Center, Engineering Dept., *Lakehurst, New Jersey* 08733 (DN696001)

The advent of V/STOL aircraft generated the need to study the problems related to V/STOL operations. Studies will include V/STOL, emergency recovery of V/STOL aircraft, environmental protection of personnel, ship, aircraft, and auxiliary equipment during vertical take-off and landing, visual landing aid requirements, and interface of these areas with aviation or non-aviation ships.

The V/STOL ship interface systems program has been divided into the following projects: (a) V/STOL emergency recovery system, (b) positioning device for V/STOL a/c, (c) V/STOL shipboard operational compatibility studies, (d) VLS for V/STOL, (e) metallic non-skids for V/STOL decks, (f) V/STOL launch interface.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0025, SOLID ROCKET MOTOR IMPACT RESPONSE STUDIES

D.C. Bickel, U.S. Dept. of Energy, Albuquerque Operations Office, *Albuquerque, New Mexico* 87115 (DF188770)

The objective is to provide experimental data on the impact response of solid propellant rocket motors (SRM). More specifically, this work will provide data on the stress/strain history of an SRM after impact and measurements of the analytically nonconducive fracture/fragmentation problem. The data is to provide an experimental data base for safety engineering studies related to the nuclear safety evaluations of current and future DOD orbital/deep space missions through the STS time frame.

Impact tests at varied impact velocities and orientations will be conducted at Sandia Laboratories, Albuquerque. Impacting mediums will include (1) unconstrained solid propellant, (2) scale model SRM's and (3) full-scale segments of SRM. Full instrumentation and photographic coverage will be provided.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Weapons Lab.

4.0026, STUDY OF ENERGY CONVERSION AND TRANSPORT IN SPACE PLASMAS

W.C. Feldman, U.S. Dept. of Energy, Los Alamos Scientific Lab., *P.O. Box 1663, Los Alamos, New Mexico* 87544

The solar wind, lower solar corona, and Earth's bow shock magnetopause provide a unique plasma in which any spacecraft approaches a truly nonperturbing diagnostic probe. This effort seeks to make use of existing satellite data to yield information and understanding of plasma and heavy-ion physics processes--evolution and saturation of heat flux mechanisms, ion beam and thermal-driven anisotropy-driven instabilities, and various sources of the free-energy in particle velocity distributions in the earth's magnetically confined upper atmosphere. Special attention is given to those phenomena which occur in magnetically confined fusion plasmas. (DOE/ER-0002)

SUPPORTED BY U.S. Dept. of Energy, Office of Energy Research

4.0027, NAVY VEHICLE DESIGN AND CONSTRUCTION - EXPERIMENTAL ANALYSIS OF MANEUVERING SLATS

G. Volpe, Grumman Aerospace Corp., *S. Oyster Bay Rd., Bethpage, New York* 11714 (DN875430; N00014-78-C-0476)

The objective of this research is to conduct an experimental analysis of wing leading edge slats for maneuvering at transonic speeds. Leading edge slats as well as other high-lift devices are being applied to current high-performance aircraft for improved combat performance at high subsonic and transonic flight conditions. However, there is a lack of high-quality systematic experimental data both for use in design and for verification of new computational design procedures that are being developed. It is the goal of this project to partially fill this technology gap.

Transonic wind tunnel experiments will be performed using a two-dimensional airfoil/slat combination. The model is configured such that the slat position can be continuously varied relative to the main wing. The experiments will be conducted in the NASA/ARC six-foot transonic wind tunnel fitted with two-dimensional inserts. The model will be instrumented for obtaining pressure distributions on both the slat and wing.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0028, INVESTIGATION OF THE FLUCTUATION MECHANISM IN TURBULENT FLOW

V. Zakkay, New York University, School of Science & Engineering, Dept. of Aeronautics & Astronautics, *Washington Sq., New York, New York* 10003 (DF042080; AFOSR-76-2947)

AF function - advanced aerospace vehicles. Opportunity - better understanding of turbulent flows. Objective - investigate the mechanisms of pressure fluctuations in a turbulent boundary layer and influences to the turbulent structure by active and passive perturbations of the flow. How work contributes - improvement in our physical understanding of turbulent flows will result in improved design capability for advanced aerospace vehicles. A better knowledge of turbulence production could indicate possible ways to influence a fully-developed turbulent flow without using additional energy. One possibility is suitably designed flexible walls. Altering the character of the turbulent flow should make it possible to reduce surface drag and turbulence-induced aerodynamic noise.

An experimental program has been established to study the change in the large-scale disturbances, called 'bursts', due to introducing controlled sources of pressure fluctuations or changes in wall characteristics. An analysis will be made to determine how the changes in the turbulent structure due to these perturbations will affect overall skin friction and radiated noise. The bursting phenomena will be studied at low (50 ft/sec) speed and at high (Mach numbers near 0.65) speed and at different boundary layer thicknesses.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0029, MULTIPLEX TERMINALS, BUS COUPLERS, CABLE CONTROL UNIT MANUFACTURE

Unknown, Telephonics, *Huntington, New York* (DN881614; N62269-75-C-0488)

The objective of this task is to procure multiplex terminals, bus couplers, and a cable control unit for use with the basic program's general-purpose multiplex system in the development of generic avionics suits for specific avionic platform systems. This contract supports work unit ZC909, Agency Accession No. DN 681082. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Communication Navigation Tech Directorate

4.0030, QUATERNARY ALLOY FOR MICROWAVE MESFETS

J.W. Harrison, Research Triangle Inst., *P.O. Box 12194, Research Triangle Park, North Carolina* 27709 (DF047650; F49620-77-C-0062)

AF function - microwave solid-state electronic devices are essential components of Air Force electronic countermeasures, communications, and signal processing systems. Opportunity - steady progress has been made in the development of high-performance microwave devices using III-V binary compounds. It is expected that still further improvements, especially in the quest for higher operating frequencies, can be obtained by developing III-V quaternary material systems for use in the fabrication of microwave devices. Objective - the objective of this research is to develop the GaInAsP quaternary material system so that it will be useful for the fabrication of superior microwave field effect transistor. How work contributes - this work will contribute to the state-of-the-art in microwave materials by developing the promising GaInAsP material system.

Liquid phase epitaxial techniques will be used to grow layers of GaInAsP on an InP substrate. Buffer layers will also be grown on some of the samples in order to shield substrate effects from the active layer. Various degrees of super cooling will be used in order to maximize the ordering of the quaternary alloy. The degree of alloy ordering and basic structural information concerning the layers will be obtained from transmission electron microscopy and X-ray diffraction techniques. These techniques will also be used to determine the structure of the alloy-substrate interface in order to insure that lattice matching has occurred. Schottky barrier profiling will be used to measure carrier density versus depth in the epitaxial layer. Resistivity and low field mobility will be measured as a function of temperature by Van der Pauw techniques. Velocity-field characteristics will be measured by observing low repetition rate current-voltage pulses and by a direct time-of-flight measurement. When device quality material can be grown, actual field effect transistor devices will be fabricated. A systematic search will be made to find suitable ohmic and non-ohmic contact materials. When devices are made they will be characterized by their static, low-frequency, and high-frequency characteristics. From all of the above steps it will then be possible to correlate device performance with the properties of the materials.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0031, EVALUATION OF EQUIVALENT INITIAL FLAW SIZES

D. Broek, Battelle Memorial Inst., Columbus Labs, *505 King Ave., Columbus, Ohio* 43201 (DN881378; N62269-77-C-0543)

Determine the effect of metallurgical inclusions and clusters of inclusions on aircraft structural integrity and damage tolerance. This work is in support of work unit ZA601, Aircraft Technology, Agency Accession No. DN681080.

A micro-optical inclusion counting procedure will experimentally estimate the statistical distributions of inclusion size and cluster size versus frequency of occurrence for one standard aircraft structural material. The probabilities of encountering large inclusions and clusters, which may be detrimental to aircraft structural integrity, will be determined from these distributions. Based on these probabilities and practical considerations, an experimental test program will be formulated to establish the correlation between inclusions and equivalent initial flaws.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0032, PERFORMANCE OF HIGH-TEMPERATURE ANNULAR HEAT PIPES

Y. Kamotani, Case Western Reserve University, Graduate School, *2040 Adelbert Rd., Cleveland, Ohio* 44106 (NSG 3268)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

4.0033, A STUDY OF DYNAMIC ENERGY EQUATIONS

V.H. Larson, Cleveland State University, School of Arts & Sciences, Dept. of Mechanical Engineering, *1983 E. 24th, Cleveland, Ohio* 44115 (NSG 3257)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

4.0034, CSEL SERVICE AND MAINTENANCE

B. Sexton, Systems Research Lab. Inc., *500 Woods Dr., Dayton, Ohio* 45432 (DF109100; F33615-77-C-1267)

The objective of this effort is to provide support for a unique Air Force facility, the Communication Systems Evaluation Laboratory located at AFAL. This facility is used to evaluate various radio frequency (rf) systems, modulation systems, navigation systems and potential jamming threats to such systems. Current systems being supported are the E-4 CCC link with the AFSATCOM satellites, and the GBU-15 glide bomb video link evaluation. This effort is in support of PMD No. R-S2134-6 dated 1 Oct 76.

The approach is to obtain the support of an on-site contractor to service and maintain the equipment in the CSEL facility. Approximately four man-years of support are provided to accomplish this mission.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0035, ANALYTICAL EQUIPMENT FOR TURBINE ENGINE CHECKOUT

K. Hamilton, U.S. Dept. of Defense, Air Force, Aero Propulsion Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF460790)

To procure equipment and instrumentation for turbine engine checkout as GFE, in-house test support, and for flight test efforts.

System requirements are defined in procurement specifications that will result in accurate, reliable and cost-effective test equipment applications. Non in-house work effort support is picked up by this work unit from former WU 30661318.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aero Propulsion Lab.

4.0036, SAR DATA ANALYSIS

R.T. Coker, U.S. Dept. of Defense, Air Force, Avionics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF097850)

To provide quantitative information on the smoothing effects of non-coherent integration of SAR data as functions of transmit frequency, azimuth angle, transmit-receive polarizations, flight path characteristics and target-background categories. The digital data used for fundamental radar parameter evaluation will also be investigated for other types of post-correlation radar processing such as polarization ratioing, azimuth and frequency discrimination.

SAR data from the polyfrequency radar which has been optically correlated and digitally recorded on magnetic tape will be the main data base for this study. This data will contain three multilook diversity dimensions consisting of four transmit frequencies by 15 azimuth aspects, by four transmit-receive polarizations. Multilook data will be digitally formed from this data base by noncoherent integration. Techniques such as polarization ratioing will also be investigated. This analysis will be done for a wide spectrum of hard targets and diffuse surfaces. The analysis will also be a function of depression angle, as well as depression and azimuth angle changes. The approach is more completely described in a detailed plan dated Jun 73, 'A Plan to Determine the Quantitative Effects of Frequency, Azimuth, and Polarization on Synthetic Aperture Imagery'.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Avionics Lab.

4.0037, DYNAMICS OF SUPERSONIC DIFFUSERS FOR LASER SYSTEMS

S. Hasinger, U.S. Dept. of Defense, Air Force, Flight Dynamics Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF136520)

This work unit supports development efforts in the area of high-energy laser weapons systems suitable for airborne applications. At present, high-energy gas dynamic and chemical lasers are deficient in that they lack efficient, compact, easily started supersonic diffusers which would allow them to be exhausted to ambient pressure conditions. It is the objective of this work unit to develop and demonstrate supersonic diffuser concepts for both gas dynamic and chemical laser applications. All concepts developed must have the following characteristics: (a) at least normal shock pressure recovery, (b) quick start capability, (c) operational simplicity, (d) size and weight compatible with airborne applications. The development of supersonic diffuser concepts with the above characteristics will greatly inhance the feasibility of the high-energy laser as an airborne weapon system.

The approach of this effort is to validate experimentally diffuser concepts which have a high probability of satisfying the pressure recovery requirements and size constraints of operational high-energy gas dynamic and chemical lasers. Although the research effort is primarily experimental, analytical techniques are used extensively in the design of concept validation experiments, and in the assessment of the data collected from these experiments. The principal diffuser concepts under investigation are the slanted cascade diffuser concept for gas dynamic laser applications, and the radial outflow diffuser concept for chemical laser applications.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0038, AIRCRAFT DEPLOYED DROPSONDE/BATHYTHERMOGRAPH

C. Calianno, U.S. Dept. of Defense, Navy, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate, *Warminster, Pennsylvania* 18974 (DN881357)

Finalize investigation of combining in a single air deployable sensor package dropsonde electronics and a bathythermograph probe and electronics. Review the compatibilities of both systems and make appropriate trade-off decisions leading to a feasibility design.

Feasibility designs will be generated based on that survey and used as cost models. Costing data including information on current ASW sensors of comparable complexity will be reviewed. Technical requirements arising from these and user surveys will be considered for incorporation in developement of an operational requirement and in the final feasiblity design approach recommended. Data transmission interpretation and use will be considered in detail. In the above process areas of technical risk will be identified and recommendations on advanced development presented. Nontechnical but essential considerations include unit cost estimate potential for replacement of existing sensors, e.g. the AN SSQ 36, the need interest of both fleet representatives and the scientific community in a multiple mission sensor.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0039, SYNTHESIS OF DIGITAL FILTER STRUCTURES WITH LOW ROUND-OFF NOISE AND COEFFICIENT SENSITIVITY

L.B. Jackson, University of Rhode Island, School of Engineering, Dept. of Electrical Engin, *Administration Bldg., Kingston, Rhode Island* 02881 (DF043990; AFOSR-76-3057)

AF function - to design optimal cost-effective digital filters for radar, communications, and telemetry systems. Deficiency - the advantages of digital signal processing are so compelling that the Air Force (as well as commercial communications companies) is gradually converting all communications systems to digital systems. However, because of short word lengths in microcomputers, the errors due to truncation in the filter coefficients and data, and round-off errors in multiplying accumulate to the point where they cannot be ignored in filter design and analysis. Objective - to devise methods for estimating the output noise (the resultant of all the errors) of a filter in the design stage, preferably by formulas giving lower bounds that are independent of the many possible ways of realizing the same transfer function. The bounds must be nearly attained for some realization, to be useful. The goal is improved signal processing capability. How work contributes - success in this research could lead to dramatically improved digital circuitry for the various electronic systems used in aerospace vehicles and communications networks.

Work will be directed toward the study of digital filter structures with low output round-off noise and low coefficient sensitivities. State-space structures with demonstrably small noise properties will continue to be the principal area investigated.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0040, AERODYNAMIC HYSTERESIS

R.D. Herron, Arnold Research Org. Inc., *Arnold Air Force Base, Tullahoma, Tennessee* 37389 (DF421053; F40600-77-C-0003)

To document the phenomena of aerodynamic hysteresis known to occur on some aircraft models.

Existing data will be compiled and analyzed to evaluate the observed aerodynamic hysteresis phenomena. Attention will be given to the effects of Mach number, Reynolds number and configuration details.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Arnold Engineering Development Center

4.0041, FINITE ELEMENT ANALYSIS OF THREE-DIMENSIONAL VISCOUS-INVISCID INTERACTING FLOWS ABOUT AUGMENTOR AIRFOILS

A.J. Baker, Computational Mechanics Consultants Inc., *Knoxville, Tennessee* (DN881477; N62269-77-C-0491)

To develop numerical solution procedures for the prediction and analysis of 3D flows associated with V/STOL aircraft propulsive systems. Present solution procedures using potential flow techniques have been found to be inadequate. This contract supports work Unit NN701, Agency Accession No. DN481077.

A parabolic partial differential equation system appropriate for the analysis of 3D turbulent jet issued from an augumentor wing in cross flow will be established. A finite element algorithm will be developed for solution of the problem.

SUPPORTED BY U.S. Dept. of Defense, Naval Air Development Center, Aircraft & Crew Systems Tech Directorate

4.0042, FURTHER DEVELOPMENT OF A CONCENTRATING COLLECTOR USING FRESNEL LENS

J. Northrup, Northrup Inc., *302 Nichols, Hutchins, Texas* 75141 (NAS8-32251)

Northrup, Inc., will redesign, develop and deliver a concentrating collector with a Fresnel lens that is improved over the present successful design. The concentration ratio will be 12 to 1. Four absorbers will be on one mounting structure with improved tracking capability. Marshall Space Flight Center will monitor the equipment's performance. (DOE/CS-0010)

SUPPORTED BY U.S. Dept. of Energy, Office of Conservation & Solar Applications, Div. of Solar Applications

4.0043, RESEARCH ON THE APPLICATION OF DECOUPLING ALGORITHM FOR STRUCTURAL ANALYSIS

E.D. Denman, University of Houston, School of Engineering, Dept. of Electrical Engineering, *3801 Cullen Blvd., Houston, Texas* 77004 (NSG 1603)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

4.0044, THEORETICAL STUDIES OF SHOCK-BOUNDARY LAYER INTERACTIONS

G.R. Inger, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Aerospace Engineering, *Blacksburg, Virginia* 24061 (DN223075; N00014-75-C-0456)

The performance of aircraft at transonic speeds, particularly during maneuvering, is severely limited by shock-boundary layer interaction phenomena which adversely affect the flow over the upper surfaces of the wings. In this study, an analytical attempt will be made to describe the interaction of a shock wave with a non-uniform stream--the non-uniformity being characteristic of either a laminar or turbulent boundary layer.

Though shock-boundary layer interaction phenomena are extremely important from an aircraft design and performance viewpoint, relatively little theoretical research has been devoted to this problem because of the inherent mathematical difficulties. In this task the flow field will be divided into four regions: one characteristic of the shock in the extreme outer portion of the boundary layer; a second characteristic of the viscous flow centered about Mach number one in the interior of the boundary layer; a third region of non-uniform but inviscid flow extending inward towards the wall; and a fourth region, viscous in nature, very close to the wall. The four regions will be combined to determine a uniformly valid description of the entire region.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

4.0045, EXPERIMENTS TO VERIFY NON-PARALLEL STABILITY THEORY

W.S. Saric, Virginia Polytechnic Inst. & State University, School of Engineering, Dept. of Engineering Science, *Blacksburg, Virginia* 24061 (NSG 1608)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

4.0046, REDUNDANT, INTEGRATED INERTIAL SENSOR ASSEMBLIES FOR ADVANCED NAVY/MARINE CORPS AIRCRAFT

J.F. Gilbert, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DN890038; N00019-77-C-0506)

The objective of this program is to conduct research and development studies and analyses which will serve as the basis for the development of new integrated avionics concepts for application in advanced Navy/Marine Corps aircraft. Specifically, this program involves the definition, study and analysis of redundant, integrated inertial sensor assemblies employing strapdown laser gyros, and study and analysis of integrated inertial/air data computations. The resultant integrated systems will provide significant improvements in operational capability and substantial reductions in maintenance, logistics support, and life-cycle costs.

The approach taken shall be to: define the aircraft, environment, composite missions, performance goals, output requirements and reliability requirements; define candidate system configurations for analysis; perform theoretical computational analyses; postulate redundancy management techniques for each configuration; study hardware modularity and specify LRU partitioning; estimate system performance and life-cycle costs; identify high-risk areas; and document results.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Air Systems Command

4.0047, AVIONICS/ENVIRONMENTAL CONTROL SYSTEM COMPUTER-AIDED DESIGN

R. Johnson, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF141990; F33615-78-C-3417)

The quality of avionics thermal management affects equipment failures and life cycle cost. Thermal management is accomplished external to equipment by aircraft environmental control systems (ECS) and internally by heat removal provisions. Multiple computer programs need to be interfaced for convenient, responsive analysis of the system aspects of thermal management. Design integration of avionics thermal management and aircraft ECS leading to optimization of reliability, performance penalties, and life cycle cost of weapon systems is the objective of this effort.

Preliminary design of computer-aided design (CAD) system architectures will be developed for avionics thermal design and aircraft ECS for convenient use by industry. Required optimization algorithms will be identified to address performance, reliability and costing parameters. A program plan will be developed to implement the CAD system design. CAD architecture walkthrough will be illustrated by a thermal design optimization and life cycle cost payoff.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

4.0048, CYCLOPHORIA AND PILOT PREDICTION OF THE RUNWAY PLANE

C.L. Kraft, Boeing Co., *7555 E. Marginal Way S., Seattle, Washington* 98124 (DF051790; F49620-78-C-0052)

AF function - this research provides information necessary to determine the density of textural cues needed in the foreground of flight simulation visual system models to offset residual cyclophoria. Deficiency - runway approaches made at night, in fog, over water or snow-covered ground, provide the pilot with few visual cues by which he can judge his altitude and distance prior to that point where relative motion becomes useful. Likewise in simulator training, in which hardware or software constraints may limit the amount of textural detail in a daylight approach, the size and shape of the runway itself are unreliable cues for the visual assessment of aircraft position relative to the runway. Under these conditions, the pilot's progressive judgment of range and altitude may be derived from his perception of the runway plane. A significant source of error in this perception may be due to 'residual' or 'resting state' cyclophoria, i.e., the wheel-like contrarotations of the eyes about their visual axes. Objective - this investigation will determine the cyclophoria resting state for a sample of AF pilots, and study the effect of this phenomenon on the pilots' perception of the runway plane under various approach conditions. How research contributes - texture specifications for visual system models will be made based upon the outcomes of this research.

A group of 12 AF pilots will be selected on the basis of visual tests so as to provide a stratified sample of residual cyclophoria. Each observer will be given two independent tests of cyclophoria (circle-bar and alternating ramp chromostereopsis tests) and the results will be correlated and used to predict the pilots' perception of the runway plane. A series of computer-generated runway representations will be photographed for presentation to the pilots, who will make comparison judgments of the runway plane, i.e., approach angle. The representations will include both day and night scenes of three different runways with several different distances out from runway threshold. The effects of various levels of textural cueing will be correlated with cyclophoria resting state permitting a specification of the minimum type and level of texture required for effective simulation.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0049, PHASE COMPENSATION FOR HIGH-POWER LASERS USING REFRACTING GAS PRISMS

W.H. Christiansen, University of Washington, School of Engineering, Dept. of Aeronautics & Astronautics, *206 Guggenheim Hall, Seattle, Washington* 98105 (DF048620; AFOSR-77-3316)

AF function - weaponry. Deficiency - high-power laser beam propagation through the atmosphere from an airborne platform typically suffers a loss of effectiveness associated with a rapid wavering of beam direction caused by phase distortion occurring in the laser cavity, optical components, or the atmosphere between laser and target. Correction of this effect is achieved by introducing compensating phase distortions actively controlled in real time by a sensing and control system. Objective - to study the possibilities and limitations of using gas dynamic flows as optical elements for introducing phase compensations in a coherent adaptive optics system. How work contributes - successful outcome of this work could result in more effective laser beam control as well as substantially reduce the flight weight of laser weapon systems.

Arrays of gas jets of different index of refraction will be controlled to achieve given desired phase distortions of plane electromagnetic waves passing laterally through the jets. Means of controlling these jets at the frequencies needed for adaptive optics will be investigated.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

4.0050, INVESTIGATION OF THREE-DIMENSIONAL SHOCK WAVE BOUNDARY LAYER INTERACTIONS
J. Stollery, Cranfield Inst. of Technology, *Cranfield, England, United Kingdom* (DF138630; AFOSR-76-3006)

Aerodynamic heating to aircraft and missiles is a design constraint at high supersonic Mach numbers. Our knowledge of fundamental flow phenomena can lessen the impact of this design constraint and expand the operating corridor of the system. First effects of heating are felt in regions of complex flow interaction which are severely complicated by the existence of streamwise vorticity. It is the objective of this effort to investigate the significants of streamwise vorticity in the development of three-dimensional interaction phenomena.

Experimental observations will be made to supplement and focus the existing body of experimental data toward the understanding of vortical influence in such interactions. Concurrent experiments in the U.S. (AFFDL) and England (Cranfield) are planned.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

GEOSCIENCES

Includes Geosciences (general); Earth Resources; Energy Production and Conversion; Environment Pollution; Geophysics; Meteorology and Climatology; and Oceanography. For Related Information See Also Space Sciences.

5.0001, LOWER-UPPER ATMOSPHERE COUPLING DURING PERIODS OF SEVERE WEATHER 13409-MS
R.J. Hung, University of Alabama in Huntsville, School of Science & Engineering, Dept. of Mechanical Engineering, *Huntsville, Alabama* 35807 (DA0E9007)

To investigate the dynamics of coupling between the lower and upper atmosphere during periods of severe weather activities. The work will lead to improved methods of detecting the possibility of severe storms from use of photographs from satellites. The military interest ranges from protection of troops and equipment to taking advantage of enemy losses from severe storms. The work supplements the Army Atmospheric Sciences Laboratory Satellite Storm Detection (SATSTM) program.

The experimental phase of the work involves improving Doppler remote sensing techniques through analysis of continuous wave Doppler signals transmitted from three sites in Alabama and received after reflection from the ionosphere at NASA/Marshall Space Flight Center, Huntsville, Alabama. The theoretical phase of the work involves calculation of infra-sonic wave properties such as mechanism of excitation, damping rate of dispersion and relationship to electron density and wind profiles.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

5.0002, SOLAR-TERRESTRIAL RELATIONSHIPS
S.T. Wu, University of Alabama in Huntsville, School of Science & Engineering, Dept. of Mechanical Engineering, *Huntsville, Alabama* 35807 (NAS 8-33443)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0003, EMERGENCY SERVICES PLANNING POLICY - EFFECTS OF BUILDING CHARACTERISTICS ON FORECASTS OF SEISMICAL ROUTE BLOCKAGES (ABBREV)
D. Schwarz, California State University & Colleges, San Jose State University, School of Social Sciences, Dept. of Geography, *Washington Sq., San Jose, California* 95192 (PFR7823097)

This research will develop techniques evaluating how well existing emergency services in earthquake-prone cities could serve earthquake victims. Indices of street blockages by rubble accumulation will be developed based on such factors as building type and mass, street-width and building set-back and slope. These data will be derived from aerial photographs where possible by delineating photomorphic regions indicative of urban form rather than the usual interpretation and classification by land-use type. These indices will be combined with existing data, especially those of spatial variation in seismic risk, and a weighting of factors will be calculated to estimate and map probably route blockages for portions of the San Francisco, San Jose, and Los Angeles, California metropolitan areas. Mapped data will include such measures as probable route distance between blockage and/or probability of blockage within a specified distance. When these maps are correlated with existing locations of emergency services, the effectiveness of such sites for serving the surrounding population following the disruption of an earthquake can be predicted. Such research can also aid contingency planning to provide optimum relocations of services and to develop policies for new urban development.

SUPPORTED BY U.S. National Science Foundation, Div. of Problem Focused Research Applications

5.0004, VERY LOW ENERGY DIFFERENTIAL ANALYZER
R.E. Laquey, Maya Development Corp., *San Diego, California* (DF580420; F19628-78-C-0012)

AF function - knowledge of the cold particle population in the ionosphere and magnetosphere and their interaction with AF satellites. Deficiency - above 2000 km, traditional integral methods of determining the low-energy charged particle distributions are seriously degraded because of low ambient concentrations. Objective - to design a very low energy differential charged particle analyzer (0.1 eV to 10 eV) to be flown on Air Force satellite missions which extend beyond a few thousand km. How research contributes - the instruments developed as a result of this work will be of great importance to all high-altitude Air Force satellite missions, in particular, flights at synchronous altitudes.

Design of a very low energy particle detector will be carried out. Calibration and test procedures will be developed. Portions of the particle counting input circuitry will be designed and fabricated, including amplifier discriminator electronics and a high-voltage power source for use with a spiral electron multiplier.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0005, NAVY ENVIRONMENT - RADAR OCEANOGRAPHY
A.M. Peterson, Stanford University, Center for Radar Astronomy, *Stanford, California* 94305 (DN475160; N00014-75-C-0356)

Fleet activities involving carrier and ASW operations depend upon a capability to forecast surface winds, wave conditions, and acoustic propagation conditions in the upper ocean. In order to improve this capability, it is necessary to look at basic phenomena near the air-sea interface such as the generation of waves and currents by wind and the deepening of the mixed layer (thereby affecting acoustic propagation conditions) by the combined influence of waves, currents, and wind. The objective of this project is to evaluate the potential for using radar for remote sensing of surface winds, ocean waves, and currents.

Both direct path and over-the-horizon radars will be used to gather data concerning the nature of radar signals backscattered from the sea surface. Independent measurements of surface winds, waves, and currents will be taken, for use in comparison with the radar backscatter. In addition, theoretical studies will be conducted to relate the nature of radar backscatter to the conditions at the ocean surface.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0006, THE CALIFORNIA INTEGRATED REMOTE SENSING SYSTEM (CIRSS)
J.E. Estes, University of California, Santa Barbara Campus, School of Letters & Science, Dept. of Geography, *Santa Barbara, California* 93106 (NCA 2-680902)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0007, DEVELOPMENT OF ROOM TEMPERATURE MERCURIC IODIDE X-RAY DETECTORS FOR IN-SITE ANALYSIS OF EXTRA-TERRESTRIAL OBJECTS
G.C. Huth, University of Southern California, School of Medicine, Dept. of Radiology, *2025 Zonal Ave., Los Angeles, California* 90033 (NSG 7535)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0008, NAVY ENVIRONMENT - STORM PRESSURE CHANGES
A.R. Jordan, (No Performing Organization Reported), *Colorado* (DN323014; N00014-73-C-0320)

The objective of this research is to study and catalogue those small atmospheric pressure changes (microbarisms) that are indicative of impending weather change and additionally to sense and diagnose pressure changes that indicate hazardous local changes for aircraft landing and take-off operations.

By means of high-sensitivity pressure sensors with accurately timed recorders measurements are made on thunderstorms, storm fronts, gust fronts, and on vortex flows. This technique of measurement is superior to that of the conventional barograph which does not detect many of these phenomena. The technique used in this research reveals the structure of atmospheric pressure fluctuations occurring on arrival of the leading edge of various weather forms.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0009, RESEARCH OF SATELLITE INFERENCES OF CONVECTIVE STORM INTENSITY
W.R. Cotton, Colorado State University, School of Engineering, Dept. of Atmospheric Science, *Fort Collins, Colorado* 80523 (NSG 5341)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0010, METEOROLOGICAL OBSERVATIONS
L.O. Grant, Colorado State University, School of Engineering, Dept. of Atmospheric Science, *Fort Collins, Colorado* 80523 (0009900; COL00104)

OBJECTIVE: Obtain meteorological data at the Colorado Experiment Station. Establish the climatology and climatological changes at the observing point. Obtain meteorological data to assist in aircraft flight forecasting by the National Flight Control System.

APPROACH: Complete observations are taken at 7:00 am and 7:00 pm MST. Airway observations are made 12 times each day on odd hours. The data are relayed by TWX to the Weather Bureau in Denver for dissemination via teletype.

PROGRESS: Meteorological observations are made at the University Weather Station to support agricultural and engineering research and to assist in operational aspects of flight forecasting by the U.S. Weather Bureau. These observations have been made at this station since 1973, and continuously since 1887. Parameters observed include: sky conditions, present weather, pressure, earth temperature, soil temperatures, humidity, wind, radiation, dew and frost deposition and evaporation during ice-free seasons. Complete observations are made twice daily at 7 a.m. and 7 p.m. MST. Airways observations are made 12 times daily on all odd hours. All of the station records from 1890 to 1972 have now been transferred to computer tapes. The compilation of a comprehensive climatology based on the availability of the computer tapes has been deposited with the Colorado State Climatology Office. A limited observation setup at the Foothills location in cooperation with the Colorado State Forest Service and the Department of Atmospheric Science allows contrast between the Foothills and main campus sites as well as providing forest fire weather data and data related to foothills grazing lands.

SUPPORTED BY Colorado State Government

5.0011, ATMOSPHERIC VARIABILITY AND AIR-SEA INTERACTION
E.R. Reiter, Colorado State University, School of Engineering, Dept. of Atmospheric Science, *Fort Collins, Colorado* 80523 (NSG 5340)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0012, MW MEASUREMENT OF LUNAR SAMPLE
H. Bussey, U.S. Dept. of Commerce, National Bureau of Standards, *325 S. Broadway, Boulder, Colorado* 80302 (2762418)

PROJECT OBJECTIVE: Measure complex permittivity of lunar material to provide a fundamental basis for interpretation of microwave and radar observations. Especially for lunar global heat flow.

PROJECT APPROACH: Design and construct multimode coaxial resonator for permittivity measurement. Evaluate resonator stability and repeatability of q and freq. program HP network analyzer to evaluate cavity. Compare measurement on selected samples using new and old holders. Measure Lunar samples. Document.

PRIOR YEAR ACCOMPLISHMENTS: Designed plus, minus 100C temperature controller.

SUPPORTED BY U.S. Dept. of Commerce, National Bureau of Standards

5.0013, STUDIES OF THE EAST AFRICAN LOW-LEVEL JET STREAM
J.E. Hart, University of Colorado, Boulder Campus, School of Arts & Sciences, Dept. of Astro Geophysics, *1200 University Ave., Boulder, Colorado* 80302 (ATM78-19962)

The objective of this research is to gain a clearer understanding of the dynamics of a low-level fast-moving stream of air called the East African Low-Level Jet Stream. The importance of this circulation to the southwest monsoon that brings heavy seasonal rains to south Asia, in particular the Indian subcontinent, is well documented. Since it transports a substantial fraction of the total cross-equatorial low-level water vapor that feeds the monsoonal rains, an appreciation of its dynamics is necessary for an understanding of the full monsoonal system.

Specific tasks of this research project include: (1) taking observations of the low-level equatorial flow incident on the East African highlands; (2) using these observations as input in a mathematical/physical model of the jet structure; and (3) validating the model by comparison with aircraft observations made in the jet out-flow region well north of the equator near the 'horn' of Africa. The PI had participated in an aircraft observation program (Monsoon 77) in this region of the world in summer 1977. That program was very successful and useful in conceptualizing and optimizing plans for this field study which is part of the Monsoon Experiment (MONEX), a regional subprogram of the Global Atmospheric Research Program (GARP).

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

5.0014, HYDRO-METEOROLOGICAL MODELING OF SOIL MOISTURE AND INTERACTIVE MOISTURE TRANSPORT PROCESSES
J.D. Lin, University of Connecticut, Storrs Campus, Inst. of Water Resources, Dept. of Civil Engineering, *Storrs, Connecticut* 06268 (NSG 5346)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0015, CHEMICAL INVESTIGATION OF METEORITES
E. Jarosewich, Smithsonian Institution, Dept. of Mineral Sciences, *1000 Jefferson Dr. S.W., Washington, District of Columbia* 20560 (6500-30)

Currently, the chemical investigation of stony meteorites is in progress. This work encompasses the chemical analysis of acid-soluble and acid-insoluble phases of meteorites for major and minor constituents. Also, the analysis of meteoritic separates is performed. The analysis of meteorites is a part of a broader study of mineralogy, petrology and classification of meteorites.

SUPPORTED BY Smithsonian Institution, National Museum of Natural History

5.0016, THE MOVABLE FINE-MESH (MFM) ANALYSIS-PREDICTION SYSTEM
Unknown, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Weather Service, National Meteorological Center, *5200 Auth Rd. S.E., Washington, District of Columbia* 20023

OBJECTIVE: To improve guidance for landfall forecasts for tropical storms and to develop improved precipitation modeling techniques.

STATUS: The MFM continues to be employed as an on-call operational model for flooding and hurricane forecasting.

Experiments continue to point to analysis errors as the primary source of forecast error in precipitation forecasts and in the most serious 'busts' in hurricane prediction.

Plans for FY79: (1) Aircraft and satellite data will be employed to establish more realistic vortex analyses. Dynamical initialization will be employed to obtain consistency between such analyses and the MFM forecast equations. (2) Tests with the regional isentropic analysis system will be carried out to determine whether it can increase the accuracy of MFM predictions. (3) Ultra high resolution predictions will be performed to study the impact of improved resolution on hurricane and precipitation forecasts. (4) A hybrid isentropic-sigma forecast model will be coded and tested to determine the advantages of such model structure in comparison to standard sigma-systems. (5) A moisture budget study will be reinitiated to help determine the role of water vapor in hurricane model behavior.

SUPPORTED BY U.S. Dept. of Commerce, National Weather Service, National Meteorological Center

5.0017, SATELLITE ULTRAVIOLET IMAGING SENSOR
G.R. Carruthers, U.S. Dept. of Defense, Navy, Naval Research Lab., *4555 Overlook Ave. S.W., Washington, District of Columbia* 20375 (DN880027)

To design and develop ultraviolet imaging sensors for use in a satellite mission, having in turn the objectives of (a) determining the perturbations of the earth's near-space environment, in the middle- and far-ultraviolet wavelength ranges, due to missiles, space vehicles, and other manmade activities; and (b) determining the morphology of natural perturbations of the atmospheric/space UV background, such as auroras, tropical arcs, and celestial objects.

Develop far- and middle-UV imaging sensors based on NRL-developed electrographic Schmidt cameras, but replacing the previously used recording film with a solid-state two-dimensional array sensor, such as CCD array, providing television readout capability suitable for use in an unmanned satellite.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

5.0018, TROPICAL DISTURBANCES IN RELATION TO GENERAL CIRCULATION MODELING
M.A. Estoque, University of Miami, Rosenstiel School of Marine & Atmospheric Sciences, Dept. of Atmospheric Science, *4600 Rickenbacker Cswy., Miami, Florida* 33149 (NSG 5342)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0019, SATELLITE RAIN OBSERVATIONS
H. Hiser, University of Miami, School of Engineering & Environmental Design, Dept. of Mechanical Engineering, *Miami, Florida* 33124 (DN624020; N00014-75-C-0172)

In support of a meteorological forecast at sea, the objective of this research is to extend satellite measurements at sea to rainfall.

Current satellite detection of rainfall is merely qualitative. A new radar development at the University of Miami (for the Army) integrates in time and space the rainfall data and stores it on digital computer tape. This instrumentation will be used in conjunction with the radar data and a rain gauge network to calibrate the satellite data.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

5.0020, RESEARCH OF OCEAN FRONTS AND APPLICATIONS TO ATLANTIC BLUEFISH TUNA UTILIZATION AND MANAGEMENT
F. Williams, University of Miami, School of Marine Science, *1 Rickenbacker Cswy., Miami, Florida* 33149 (NSG 5344)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0021, ION AND ELECTRON MICROPROBE ANALYSES OF METEORITIC MINERALS
J.V. Smith, University of Chicago, School of Physical Sciences, Dept. of Geophysical Science, *5801 S. Ellis Ave., Chicago, Illinois* 60637 (NSG 7550)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0022, RESEARCH OF EXTENDED-RANGE FORECASTING PROBLEMS-BLOCKING
T. Chen, Iowa State University of Science & Technology, Graduate School, *Beardshear Hall, Ames, Iowa* 50010 (NSG 5339)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0023, WETLAND SOILS AND DRAINAGE MAPPING USING AIRBORNE SENSING TECHNIQUES
Breault, General Electric Co., *5030 Herzel Pl., Beltsville, Maryland* 20705 (FH-11-9271; FH160983 (TRAIS NO.))

Objectives of study are to demonstrate and document the cost effectiveness of using remote sensing methodology to map wetlands engineering soils data.

SUPPORTED BY U.S. Dept. of Transportation, Federal Highway Admin.

5.0024, GEODYNAMICS
B. Chovitz, U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Ocean Survey, Geodetic Research & Development Lab., *6001 Executive Blvd., Rockville, Maryland* 20852 (836960E0)

In line with a Principal NOS Goal for providing nationwide geodetic control reference points, and the approved objectives of strengthening and adjusting the horizontal and vertical control networks, it is important to be able to obtain extremely accurate

supercontrol points closely monitored for temporal variations in positions as long-range foundation for these expensive adjustments.

These control points can be provided for by new advanced means of observations. The principal methods being considered are radio interferometry, lunar laser ranging, laser ranging to satellites (in particular, the LAGEOS satellite, launched in May 1976), inertial positioning, and ranging on the Department of Defense Global Positioning System.

Another potential capability of these methods is the possibility of being applicable to conventional first-order field survey work.

The VLBI method has already been chosen for determination of polar motion, and collaboration with NASA is underway. The other methods are being investigated by means of error analyses, and monitoring hardware development.

SUPPORTED BY U.S. Dept. of Commerce, National Oceanic & Atmospheric Admin., National Ocean Survey

5.0025, MICROWAVE INFRARED RETRIEVAL
E.C. Rieffenstern, Environmental Research & Technology Inc., *696 Virginia Rd., Concord, Massachusetts* 01742 (DF244770; F19628-76-C-0135)

AF function - weather analysis and forecasting for military operations. Deficiency - inability to determine meteorological conditions over inaccessible or unfriendly territory. Objective - to develop techniques to better utilize the microwave-infrared vertical probing capability of the Defense Meteorological Satellite. How development contributes - improves the ability to infer and forecast atmospheric temperature profiles. Data collected by the DMSP microwave and infrared sounders will be processed so as to provide accuracy of profiles with minimum computer time. The development activity will allow simulation of advanced sensors for DMSP.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0026, INTERACTION OF MONATOMIC AND DIATOMIC MOLECULES WITH SOLID SURFACES
H.Y. Wachman, Massachusetts Inst. of Technology, School of Engineering, Dept. of Aeronautics & Astronautics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF042650; F44620-76-C-0036)

AF function - aerospace vehicles. Deficiency - Air Force flight operations are affected by atmospheric conditions of cloud formation, ice formation on vehicle surfaces or as clouds or precipitation, by fog, and by particle impact damage. Lack of knowledge of aerosol dynamics and of nucleation and growth of ice crystals increases the difficulty of devising ways to achieve all-weather capability in weapons delivery. For vehicles at orbital altitude, lack of fundamental dynamical information about the behavior of gas-crystal boundaries and adsorbed layers hinders the design of sensor and windows and the assessment of their contamination by ambient gases. Objective - to obtain fundamental data in the laboratory which are necessary to complete models of the dynamics and growth of snow and ice in high-altitude clouds and assess the effect of the operation of aerospace vehicles on atmospheric properties, to study in detail the dynamics of aerosols which are of interest to applications to flight environment and to pollutant diffusion, and to substantially improve the laboratory capability to measure the properties of target surfaces as they influence the dynamics of impinging gas molecules. How work contributes - this work will contribute to the understanding of the dynamics of ice particle and water droplet formation and dispersion and the dynamics of adsorbed layers of molecules.

Time of flight (TOF) spectrometer measurements will be made of molecular beams impinging on target surfaces and of molecules from the beam as they are scattered by the surface in various directions. These TOF measurements, when combined with surface force measurements, can be used to determine residence times of particles on the surface and also the energy and momentum exchange at the surface. Theoretical studies will treat the problem of homogeneous nucleation and the dynamics of adsorbed layers.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

5.0027, CLIMATOLOGICAL AND STATISTICAL DATA ANALYSIS
L. Burke, Regis College, Undergraduate School, *235 Wellesley St., Weston, Massachusetts* 02193 (DF279870; F19628-76-C-0009)

AF function - design of aerospace systems. Deficiency - require meteorological data in greater detail and complexity for adequate design and aerospace operational doctrine. Research - methods of synthesizing and presenting available information. How research contributes -describes the variability of atmospheric parameters in formats required in Air Force design and operation. Objective - the objective of this program is to perform mathematical and statistical operations on all types of meteorological observational data. This includes analysis and evaluation of meteorological records, rocket and balloon flight data, aircraft and field test data.

Apply statistical and meteorological theory along with computer techniques to the climatic record.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0028, SATELLITE INSTRUMENT DESIGN ANALYSIS AND SYNTHESIS OF SATELLITE MEASUREMENTS
F.J. Rich, Regis College, Undergraduate School, *235 Wellesley St., Weston, Massachusetts* 02193 (DF249550; F19628-77-C-0122)

AF function - surveillance, communication, navigation, ionosphere and magnetosphere modelling. Deficiency - inadequate knowledge of satellite environment interactions and ionosphere-magnetosphere electrical properties for operational needs of AF systems. Objective -design rocket, satellite and shuttle experiments for the study of plasma motions, electric fields, electron hole generation, irregularities and high-latitude current systems. How research contributes - improves Air Force space vehicle reliability and survivability, provides data essential for the design and high performance of communication, guidance and surveillance systems under normal and disturbed conditions. Contributes to the development of Air Force operational ionosphere prediction programs and to the solution of spacecraft charging problems.

Design and develop rocket, satellite and shuttle experiments for the study of dynamical processes in the ionosphere and magnetosphere, space vehicle-environment interactions, generation and monitoring of atmospheric perturbations. Analyze and synthesize space flight results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0029, CLOUD SPECIFICATION BY AUTOMATIC MULTISPECTRAL IMAGERY ANALYSIS
R.K. Mehra, Scientific Systems Inc., *1640 Massachusetts Ave., Cambridge, Massachusetts* 02138 (DF248620; F19628-77-C-0208)

AF function - all-weather operation of tactical and strategic forces. Deficiency - limited ability to specify and forecast cloud conditions globally in real time. Development - develop numerical techniques to specify cloud conditions automatically using multispectral imagery data from existing and potential sensors on meteorological satellites. How development contributes - improve ability to specify cloud altitude, to determine whether cloud is ice or water, and to detect areas of precipitation.

Combine imagery information from visible, near IR, IR, and microwave frequencies. Utilize available satellite imagery and model imagery for frequencies not yet available.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0030, MAGNETIC SIGNATURES AND INDICATORS
P.F. Fougere, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF249260)

AF function - operation of systems for communication, surveillance, guidance and navigation. Deficiency - system performance is degraded at times of severe geomagnetic disturbances when there are extreme departures from the normal conditions in the propagation environment. Objective - incorporate measurements from a mid-latitude magnetometer network into a method for specifying the onset and intensity and eventually forecasting geomagnetic disturbances. How research contributes - development of methods for forecasting geomagnetic disturbances will enable system operators to take appropriate measures to lessen the impact of such disturbances on military operational capability.

Measurements from a mid-latitude network of magnetometers will be used to investigate the magnetic variation signatures and micropulsation activity associated with geomagnetic disturbances. A magnetic activity index will be developed from the data by determining the diurnal variations at each station that result from quiet ionospheric current systems. Once these variations are known, accurate measurements of magnetic disturbances can be made at each station and combined to yield in real-time an index that correlates well with the KP index. The mid-latitude signatures of geomagnetic disturbances will be studied for a number of specific events when additional data are available from satellite and airborne instruments. A characteristic signature would define the onset, time development, and intensity of disturbances. Geomagnetic micropulsations measured by the network should be sensitive indicators not only of geomagnetic activity, but of the overall configuration of the magnetosphere and the processes that may precede a disturbance. The diurnal characteristics of micropulsations will be analyzed from daily spectrograms of the data showing the time behavior of the frequency and intensity of activity. A knowledge of the characteristics of micropulsation activity for both quiet and disturbed times will make it possible for network observations to be used for forecasting purposes.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0031, MICROPROCESSOR APPLICATION FOR SOUNDING ROCKET INSTRUMENTATION

J.R. Griffin, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF580660)

AF function - development of intrumentation for Air Force research vehicles. Deficiency or opportunity - telemetry instrumentation required for field use and remote operational areas require more effective capabilities prior to and during flight of research vehicles. A reliable pulse code modulation decommutator is required for data analysis prior to vehicle launch. A universal pulse amplitude modulation simulator is required for system(s) test prior to vehicle flight. During flight of research vehicles trajectory displays are not adequate. Objective - apply state-of-the-art microprocessor technology to develop a new generation of ground-based instrumentation and tracking systems. How research contributes - instrumentation and techniques developed will provide improved testing procedures of research vehicles prior to flight. Improved real-time data analysis capability will provide reliable and effective pre-launch go-no-go decision criteria at remote launch sites. Improved trajectory displays will allow in-flight correction of ground-controlled vehicles at remote launch areas.

A study will be made as to which criteria should be used for each type of instrumentation - microprocessor plus software design, or a combination of software and hardware design. A team approach will be taken to develop basic requirements. Based upon best approach, a pulse code modulation decommutator will be developed for field use. The necessary software and hardware will be developed. A similar progression will be taken for the pulse amplitude modulation simulator and real-time trajectory display instrumentation. Upon completion of feasibility designs, the instrumentation will be fabricated in suitcase-size units and tested during field operations of opportunity.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0032, IMPROVED DETERMINATION OF THE GRAVITY FIELD BY USE OF SEASAT

G. Hadgigeorge, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF582360)

AF function - estimation and refinement of the earth's gravity field. Deficiency - lack of detailed knowledge of the gravity field contributes to missile guidance errors. Objective - determine the global gravity field with maximum accuracy and precision from satellite altimetric measurements, gravimetric observations and other geophysical data. How research contributes - improved missile guidance performance from reduction of geodetic and gravity errors.

Mathematical algorithms will be tested and/or modified for highly efficient data processing, so that a detailed global gravity field can be constructed. The accuracy and resolution of altimeter residuals will be assessed to determine their usefulness in depicting short-wavelength geoid features. Develop quantitative gravity prediction methods by correlating short-wavelength geoid residuals with geophysical features of the ocean.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0033, ULTRAVIOLET SURVEILLANCE BACKGROUND MEASUREMENTS

R.E. Huffman, U.S. Dept. of Defense, Air Force, Geophysics Lab., *L.G. Hanscom Field, Bedford, Massachusetts* 01731 (DF581300)

AF function - target detection, surveillance, attack assessment, tracking, communications. Deficiency - insufficient information concerning the spatial and spectral variability and magnitude of the global vacuum ultraviolet (VUV) radiation background. Objective -measurement with satellite sensors of the intensity of the VUV background, its spatial and spectral variation, and its correlation with ionospheric, solar, aeronomic, and auroral parameters. How research contributes - the background radiation from the earth's atmosphere must be known in detail for use with missile target intensities in the design and evaluation of new surveillance systems capabilities and for selecting optimum wavelength bands. Improvement in communications system operation will be possible following validation of indicated correlations of VUV radiation with ionospheric critical frequencies and auroral zone locations.

The global VUV radiation levels will be measured with the satellite experiment CRL-246 vacuum ultraviolet backgrounds. A spectrometer will provide resolution in the range 1050-3100 Angstroms, and a photometer will provide spatial resolution comparable to systems resolution. The experiment will be flown on space test program flight S77-2.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

5.0034, OCEAN FORECASTING EXPERIMENT (OFEX)

S.A. Piacsek, U.S. Dept. of Defense, Navy, Naval Ocean Research & Development Activity, Naval Oceanographic Lab., *Bay St. Louis, Mississippi* 39529 (DN894403)

To develop scientifically valid ocean forecast models with operational utility. They will be able to periodically incorporate observational data (including those from satellites), and execute on operational Navy computers. Their purpose is to provide regional and global ocean environmental information for acoustic propagation models and air-sea exchange parameters to the atmospheric prediction model.

To solve numerically the equations of hydrodynamics and thermodynamics relevant to the scale of motion or ocean region considered. Particular emphasis will be placed on (a) coupling a limited-area model, accepting local data input to the large-scale flow; (b) correct handling of vertical and sea-air exchange processes; (c) utilization of satellite-derived sea surface temperatures and wind stresses.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Ocean Research & Development Activity

5.0035, MAGNETOPAUSE STUDIES USING SATELLITE DATA
B.U. Sonnerup, Dartmouth College, School of Engineering, Dept. of Engineering, *P.O. Box 833, Hanover, New Hampshire* 03755 (NSG 5348)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0036, ACOUSTIC AND GRAVITY WAVES IN THE NEUTRAL ATMOSPHERE AND THE IONOSPHERE
N.K. Balachandran, Columbia University, Graduate School, *109 Low Memorial Library, New York, New York* 10027 (NAS 8-33378)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0037, EVALUATION OF DIFFERENTIAL ABSORPTION LIDAR
W.F. Herget, U.S. Environmental Protection Agency, *Research Triangle Park, North Carolina* 27709 (DF336430)

To evaluate the capability of differential absorption lidar for remote (non-contact) sensing of environmental pollutants generated by Air Force operations. Presently available point monitoring sensors have proven unreliable/inappropriate for determining the contribution of airfield operations to local environmental quality. A DIAL system would provide an integrated pollutant map.

An existing differential absorption lidar (DIAL) system will be used on targets of opportunity to determine the suitability of DIAL measurements for mapping concentrations of pollutants including hydrocarbons and sulphur dioxide. Joint funding with EPA.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Civil & Environmental Engineering Development Office

5.0038, TECHNIQUES FOR APPLICATIONS OF SATELLITE DATA TO THE QUANTITATIVE FORECASTING OF PRECIPITATION
F.W. Decker, Oregon State Higher Education System, Oregon State University, School of Science, Dept. of Atmospheric Science, *126 Agricultural Hall, Corvallis, Oregon* 97331 (NSG 5343)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0039, SATELLITE DATA AND DYNAMIC PRINCIPLES IN UNDERSTANDING GLOBAL WEATHER PHENOMENA
J.H. Clark, Pennsylvania State University, University Park Campus, School of Earth & Mineral Science, Dept. of Meteorology, *116 Deike Bldg., University Park, Pennsylvania* 16802 (NSG 5347)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0040, CONDUCT A WORKSHOP FOR REMOTELY SENSED COASTAL AND OCEANOGRAPHIC DATA IN THE U.S. NORTH ATLANTIC REGION
V.K. Tippie, University of Rhode Island, Graduate School of Oceanography, *Administration Bldg., Kingston, Rhode Island* 02881 (NAS13-112)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0041, FORECASTING TROPICAL CYCLONE RECURVATURE WITH UPPER TROPOSPHERIC WINDS
R.C. Gentry, Clemson University, School of Science, Dept. of Physics, *Long Hall, Clemson, South Carolina* 29631 (NSG 5349)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0042, STUDIES RELATED TO ELECTRODYNAMICS OF THE TETHERED SUBSATTELLITE SYSTEM
P.R. Williamson, Utah Higher Education System, Utah State University, Graduate School, *Main Bldg., Room 132, Logan, Utah* 84321 (NAS 8-33381)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0043, MEASUREMENTS OF THE GLOBAL DISTRIBUTION OF CARBON MONOXIDE IN THE TROPOSPHERE
E.C. Kindle, Old Dominion University, School of Sciences & Health Professions, Dept. of Physics & Geophysical Science, *P.O. Box 6173, Norfolk, Virginia* 23508 (NCC 1-2)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0044, DEMONSTRATION PROJECT & EVALUATE THE OPPORTUNITIES FOR OPERATIONAL APPLICATIONS OF LANDSAT DATA IN WISCONSIN
Unknown, University of Wisconsin, Madison Campus, Graduate School, *500 Lincoln Dr., Madison, Wisconsin* 53706 (NAS 5-25505)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

5.0045, SATELLITE IMAGERY
F. Leberl, Technische Universitat Graz, *Rechnauerstrasse 12, Graz, Austria* (DA0D9409; DAERO 78 G0044)

To undertake a study to define a successful, economical computer procedure to register a satellite image of the earth's surface with a digital line map.

Undertake a computer study of the methods for digital-detection of linear patterns from a satellite.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Research & Standardization Group

5.0046, TRANSIONOSPHERIC PROPAGATION - MIDDLE EAST
H.H. Hossinieh, Geophysics Inst., *Tehran, Iran* (DF582500; AFOSR-74-2673)

AF function - communications, radar and navigation. Deficiency or opportunity - lack of knowledge of the low-latitude ionosphere yields communications outages and navigation inaccuracies. Objective - the object of this research is to measure and catalogue ionospheric parameters over the Middle East. How research contributes - by measuring scintillation and electron content provides input data to a global ionospheric model used for navigation error and signal loss prediction.

The approach is to observe total electron content in the Middle East by polarimetry of signals from transmitting satellites.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Geophysics Lab.

LIFE SCIENCES

Includes Life Sciences (general); Aerospace Medicine; Behavioral Sciences; Man/system Technology and Life Support; and Planetary Biology.

6.0001, EVALUATION OF VISUAL DISCRIMINATION PRETRAINING

B.J. Edwards, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Williams Air Force Base, Chandler, Arizona* 85224 (DF222210)

To investigate the effectiveness of specific training methodologies in training the essential visual discriminations required to perform the final turn of the normal landing pattern and to develop a set of audiovisual training materials which will provide training for student pilots in these visual discriminations.

An iterative training product development cycle will be employed to develop audiovisual materials for use in training of the visual discriminations. Instructional systems development (ISD) procedures and methodologies from the fields of educational technology and educational psychology will be employed. The effectiveness of experimental training materials in imparting visual discrimination skills will be empirically validated and then evaluated by executing the final turn in simulated and real time environments.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0002, ALTERED GRAVITY AS A RESEARCH TOOL IN THE STUDY OF MAMMALIAN AGING AND LIFE SPAN

R.C. Ballard, California State University & Colleges, San Jose State University, School of Science, Dept. of Biological Science, *Washington Sq., San Jose, California* 95192 (NCA 2-675906)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

6.0003, INVESTIGATE EFFECTS OF SOLAR ULTRAVIOLET-B ON PHOTOSYNTHESIS IN MARINE GRASSES

G.N. Wells, Florida Inst. of Technology, School of Science & Engineering, Dept. of Biological Science, *Country Club Rd., Melbourne, Florida* 32901 (NAS 9-15846)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

6.0004, PREDICTION OF AIRSICKNESS SUSCEPTIBILITY IN NAVY FLIGHT STUDENTS

F.E. Guedry, U.S. Dept. of Defense, Navy, Naval Aerospace Medical Research Lab., Perceptual & Behavioral Sciences Div., *Pensacola, Florida* 32508 (DN777378)

The objective is to develop procedures that will improve prediction of airsickness susceptibility. Potential benefits of this project are improvement of selection and placement methods and early detection of individuals who would benefit from therapeutic and preventive options.

Several tests involving measurement of immediate perceptual reactions to motion situations and adaptive changes in these reactions are under development. Performance on these laboratory tests is being related to other indices including a motion sickness questionnaire in an effort to isolate response tendencies which suggest extreme airsickness susceptibility in Navy flight students. Tests are being administered on a retrospective basis to airsickness referrals and on a prospective basis to a large group of student naval flight officers. Prospective validity estimates from coordination with another project on incidence and costs of airsickness are being obtained.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Aerospace Medical Research Lab.

6.0005, HUMAN PERFORMANCE MEASUREMENT IN AIR SYSTEMS

D.A. Norman, U.S. Dept. of Defense, Navy, Naval Training Equipment Center, Human Factors Lab., *Orlando, Florida* 32813 (DN221040)

To improve control of the training process and of computer-based training systems in particular through development, test and evaluation of a comprehensive subsystem for the measurement of human performance. The availability of precise and relevant assessment structures can increase training effectiveness by giving a true picture of skill acquisition level at any point in the training process.

Identify appropriate training settings; select a class of desired trainee behaviors for exhaustive analysis; define and implement a measurement structure based on a measurement subsystem of adequate complexity; conduct empirical tests to evaluate techniques for discriminating among candidate members of a measurements pool; investigate the utility of highly refined measurement subsystems in training process control, e.g., ability to predict the trainee's readiness to transfer.

SUPPORTED BY U.S. Dept. of Defense, Naval Training Equipment Center, Human Factors Lab.

6.0006, INVESTIGATION OF CERVICAL SPINE DYNAMICS

Y.K. Liu, Tulane University of Louisiana, School of Engineering, Dept. of Biomedical Engineering, *New Orleans, Louisiana* 70118 (DF320340; F33615-76-C-0526)

The objective of this effort is to provide anatomical, structural and loading data on the human cervical spine for incorporation as part of a biological parameter data set into the dynamic head-spine computer model presently at AMRL/BBM. The data generated will improve the analytic predictive capability provided by the above-mentioned model by allowing detailed analysis of head-spine response (including potential injury assessment) during ejection from aircraft, aircraft crashes or other high-level impact loading of the human body, and while taking into account various external body constraints and head encumbrances.

A literature search for previous work, both experimental and theoretical, in the area of cervical spine dynamics will be performed. Segments of at least six human cervical spine specimens will be tested statically, dynamically and to failure for their axial, anterior-posterior and lateral loading characteristics. Care will be taken to ensure appropriate specimen selection to provide structural and loading data as characteristic as possible of Air Force flight personnel.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0007, SENSORY MECHANISM MODELING STUDY

D. Shenna, Whittaker Corp., *335 Bear Hill Rd., Waltham, Massachusetts* 02154 (DF227900; F33615-76-C-0039)

To investigate, develop, and validate a model of human motion and force sensory mechanisms including the visual, vestibular, and somatic systems and their respective interactions in order to exploit artificial means of stimulation for improved simulation of the flight environment. This multisensory model will be used to determine the motion and force simulation requirements for current and future flying training simulators.

Recent data and models of the various motion and force sensory mechanisms will be compiled and where the sensory models are found to be deficient or nonexistent new models will be developed. These models will then be integrated and implemented on a computer to produce a composite multisensory model. The composite model will then be exercised and tested and validated using existing psychophysical data and data derived from specialized motion devices. The model will then be stimulated by generated flight and simulator inputs in order to determine which sensory mechanisms are being exercised and to what degree under various conditions. From this, information on new and the optimum use of existing motion and force cuing devices will be developed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0008, CARROT TISSUE DEVELOPMENT DURING SPACE FLIGHT

A.D. Krikorian, State University of New York, Stony Brook Campus, School of Arts & Sciences, Dept. of Physics, *Stony Brook, New York* 11790 (NAS 2-10150)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

6.0009, MODELING OF HUMAN JOINT STRUCTURES

A.E. Engin, Ohio State University, Columbus Campus, School of Engineering, Dept. of Engineering Mechanics, *190 N. Oval Dr., Columbus, Ohio* 43210 (DF323680; F33615-78-C-0510)

This effort is for the purpose of developing and compiling available data on analytical models of human long-bone joints. These efforts will result in the formulation of joint structure algorithms which are to be incorporated into the presently available articulated total body (ATB) model at AMRL. This total development will result in a capability to analytically predict human limb motion during total-body impact exposures such as encountered during ejection from aircraft accelerations, aircraft crashes or escape module ground impact, as well as during body exposures to prescribed windblast forces during ejection into a wind stream.

Analytic models of the long-bone joints of the human body will be formulated. The bony geometric and ligamentous structure of the joints will be included in the models, and the effects of musculature evaluated. Data from previous joint-structure studies will be used and additional modeling performed to provide joint-descriptive computer algorithms for each of the joints. The properties of the analytic joints will be compared to previously gathered data on joint torque vs. orientation properties, and where necessary, additional experimental studies will be performed to validate analytically developed joint models.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0010, IDENTIFICATION OF FINITE STATE MODELS OF A HUMAN OPERATOR

R.A. Miller, Ohio State University, Columbus Campus, School of Engineering, Dept. of Industrial & Systems Engin, *190 N. Oval Dr., Columbus, Ohio* 43210 (DF046260; AFOSR-77-3152)

AF function - Air Force operations involve a multitude of control related information processing and decision making tasks which are performed by aircrew personnel. Deficiency - the proposed research will systematically analyze discrete control decisions of human operators within a systems context. The work will develop the structures required to analyze and represent discrete control tasks. The models and analysis procedures will be verified on data supplied by AMRL. Objective - the key objectives in this research effort include - 1) incorporating coordinating and supervisory decisions made by a supremal unit into the existing model, 2) estimating parameters of a two-level model (supremal units, infimal units) from experimentally obtained data, and 3) determine the degree to which explicit decision models (as opposed to input-output models) can be constructed for discrete control systems. How research contributes - this research program continues to be the only attempt to analyze discrete control decision in a systems context. It is the only attempt to date to consider the structural characteristics of such systems and to use minimal state structures to represent discrete control data (i.e., structure is deduced from the data, not imposed by the analyst). The research is a direct step toward improved ability to predict manned system performance.

The proposed research consists of three major parts: theoretical work on modelling multilevel discrete control systems involving human operators, methodological and statistical work needed for identification and parameter estimation, and empirical testing and evaluation of these structures and methods.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0011, CHANGES IN THE ORGAN OF HEARING PRODUCED BY SOUND

D.J. Lim, Ohio State University, Columbus Campus, School of Medicine, Dept. of Otolaryngology, *370 W. 9th Ave., Columbus, Ohio* 43212 (DF322410; F33615-77-C-0512)

The purpose of this work unit is to examine changes in the auditory system produced by exposure to excessive sound. The effort will emphasize studies in the infrasound (1-20 Hz) region and long-term, low-level exposures at mid-frequencies (600-2000 Hz). Goal of the research is a reasonable hypothesis of the mechanism of injury production that provides a rationale for treatment and prevention. Results of this basic research are used in the AMRL applied technology program in establishing guidelines for limits of exposure and methods of protection from exposure to excessive sound. Ultimately this forms the basis for Air Force regulations governing exposure and protection criteria. Data are also used by the Environmental Protection Agency.

Infrasound exposures will be carried out only on experimental animals. Long-term, low-level exposures will be carried out on experimental animals and human volunteer subjects at levels which do not produce permanent changes in hearing. Techniques to be employed include light and electron microscopy of inner ear structures, electrophysiological measures of middle ear muscle activity and psychoacoustic measures of changes in auditory acuity.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0012, CONTACT AREAS OF THE FACET JOINTS OF THE PRIMATE SPINE

S.P. Combs, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF324210)

To determine the contact areas of the facet joints of rhesus monkey, baboon, and chimpanzee spines. This is to determine the anatomic position (e.g., flexion, extension) of maximum contact of the facet joints which should correspond to the position of maximum load bearing of the facet joints of the spine. The ultimate objective is to determine the position of the spine for maximum load bearing and thereby determine the best position of the spine for the ejection environment.

The cadaver spines of primates will be fitted into a testing jig allowing a multisegmental portion of the spine to be tested under an axial load in various positions (e.g., flexion, extension). Serial photographs will be used to measure the spine's response to the load. Three equidistance load cells on a force plate at the bottom of the jig will allow accurate measurement of the load applied and its vector. The spine will then be serially dissected removing muscles, joint capsules and ligaments. The entire specimen will then be stained using a Prussian blue dye. At the end of the experiment, the segments will be disarticulated and the areas of contact measured. The variance of the contact areas can then be correlated with the overall position of the spine. The procedure will be used for five rhesus monkey, baboon, chimpanzee spines. The information obtained will then be used for future experiments of loading of these primate spines and their response to the load.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0013, HEAD AND EYE MOTION IN MOIFE

C. Harmond, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321260)

The objective is to quantitatively describe the motion of the head and eye in multiple-axis vibration environments associated with low-level high-speed flight. These descriptions will be in the form of transfer functions or describing functions. These functions will have two uses which are (1) to predict the efficacy of helmet-mounted display and pointing systems in turbulent and buffeting flight environments and (2) as a subcomponent of a predictive model for visual performance in multiaxis oscillating inertial force environments (MOIFE).

The first step will be to quantitatively measure head motion. Several methods will be attempted including miniature accelerometers and helmet-mounted sight systems. Upon satisfactory completion of the head measurements the eye measurements will be undertaken. At this point in time these measurements are expected to consist of transfer functions derived from information concerning phase shifts and motion amplitude changes needed to stabilize oscilloscope patterns in the visual field of a subject undergoing whole body vibration.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0014, MODELLING OF HUMAN RESPONSE TO AERODYNAMIC FORCE

I. Kaleps, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF322950)

Exposure to a high-speed wind stream during ejection from an aircraft poses a serious threat to the safety of the ejectee. Methods are needed for assessing the extent of this hazard under various flight conditions and for different ejection modes and systems. This program seeks to provide an analytic methodology for predicting human body response to wind forces encountered during ejection from aircraft. It will deal with both experimentally and theoretically specified aerodynamic environments in providing body response predictions.

The main modeling emphasis will be placed on the development and refinement of the articulated total body (ATB) model and the preparation both from separate experimental programs and by theoretical means of quantitative specification of the aerodynamic environment surrounding the human body during ejection. The model will be applied to predict body limb motion resulting from the prescribed aerodynamic environments. It will also provide predictions of stresses and torques within the major long-bone joints and estimates of probable injury resulting from limb excursions outside of normal ranges of motion.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0015, FAILURE CHARACTERISTICS OF SPINAL ELEMENTS

L.E. Kazarian, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321440)

Spinal injury continues to be a problem associated with ejection from USAF aircraft. This investigation is being carried out in two phases in order to provide a qualitative and quantitative basis for modeling actual operational vertebral injuries. The initial phase of this investigation deals with the identification and classification of spinal injuries. The second phase is an experimental investigation to provide for the first time quantitative data on the nature of the local response of spinal vertebrae to complex mechanical loads and formulation of clinical methodology for recognition of these spinal injury patterns.

Results of past and present studies on spinal impact loading experiments will be scrutinized to identify mechanisms of failure. Similarly, clinical records involving spinal injuries will be studied to examine the structural mechanisms of the particular types of injuries identified. Additional experiments will examine the isolated vertebral centra under compressive loading at three different strain rates. The results of this effort will assist the formulation of a new mathematical model under RTE 3-H-3 depicting the structural, mechanical and material property response of isolated vertebral elements encompassing their rate-dependent and nonlinear characteristics. These data will also provide a quantitative basis for increasing allowable load transfer levels to man by impact loading during ejection from aircraft.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0016, DETERMINE AIRBASE/COMMUNITY NOISE FROM AF AIRCRAFT/ENGINES OPERATING WITH GROUND RUNUP NOISE SUPPRESSORS

R.A. Lee, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF323240)

Aircraft ground runups are one of the major sources of noise on base and in surrounding communities. Many times aircraft runup noise suppressors are used to reduce the radiated energy. The Noisefile used in Noisemap presently includes only nominal design levels for such suppressors since adequate measured data as a function of angle around the source are not available. HQ USAF/PRE and MAJCOMS clearly intend to use Noisemap as a tool for assessing the need for and potential effectiveness of such multi-million-dollar suppressors in specific situations. The object of this work unit is to acquire the data needed to define the noise radiated by AF aircraft using standard runup noise suppressors in ways suitable for use by Noisemap and also for incorporation into the Noise Data Handbook.

Current plans consist of acquiring noise data on the F-106 noise suppressor system at Selfridge ANG during March and April 1978. Completion of this noise test will provide data on the complete list of identified noise suppressor systems in the USAF inventory. These data will then be included in the AMRL Noisefile. Current plans are also to publish all the acquired noise suppressor data in the USAF Bioenvironmental Noise Data Handbook (AMRL-TR-75-50) and as an additional volume to acoustic data on military aircraft (AMRL-TR-73-110).

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0017, CONTROL-DISPLAY INTEGRATION AND EVALUATION

J.L. Porterfield, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF321060)

The purpose of this work unit will be to develop new control, display, and feedback hardware and software concepts that utilize hand, head, eye, and other human response modes as controllers to improve the piloting, weapon delivery, and reconnaissance sensor control of manned and unmanned aircraft. This work unit supports AFSC development goal TC-2.

The basic approach will be to collect man-machine system performance data on laboratory simulation, breadboard, and/or prototype equipment designed to make efficient use of the human's natural perceptual and response capabilities. The final product will be new equipment concepts and designs that have been developed from and validated by man-machine system performance data. The following control-display hardware concept work is planned: (1) eye and head controlled switching, (2) tracking situation display, (3) multi-resolution eye aimed television, (4) helmet-mounted oculometer, (5) voice controller, (6) eye controlled sensor zoom, and (7) target trajectory and operator response predictor displays. In addition, pilot studies will be conducted on new concepts for the display of control information, the use of non-utilized human response modes to control equipment, and techniques to modify the human's response signals to obtain more optimum control. A basic tool to be utilized in this work will be the use of digital computers as follows: (1) to process the environmentally sensed information before it reaches the display, (2) to filter and modify the human's response signals before they reach the controlled element, and (3) to process and modify feedback information about the controlled element before it is returned to the display. This effort was previously reported under work unit 7184-04-43, Control Concept Development.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0018, SPECIALIZED ELECTRONIC INSTRUMENTATION FOR MANNED SIMULATION

D.A. Ratino, U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab., *Wright Patterson A.F.B., Dayton, Ohio* 45433 (DF322470)

Highly specialized prototype electronic devices are needed for TPO 7 human performance research. The production of these highly specialized one-of-a-kind items within an in-house work unit has many benefits to the Air Force including reduction of manhours and material costs, time savings, enhanced coordination with users, and minimum administrative efforts. The items to be produced will be determined by the needs of the research teams. The first item under this new work unit will be the development of specialized electronic circuits for use in a radar simulator display.

Prototype electronic devices will be designed, fabricated, and bench tested in support of Division research projects.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0019, ANTHROPOMETRIC DATA FOR PILOT PERFORMANCE SAFETY

J. McConville, Webb Associates Inc., *Old Rte. 68 S., Box 308, Yellow Springs, Ohio* 45387 (DF318270; F33615-78-C-0508)

To provide engineering-anthropometric data and techniques for guiding the design and evaluation of cockpit and other workstation geometries and the design and evaluation of personal-protective equipment for AF men and women, and to provide the anthropometric and mass distribution bases for the design of analogues used to simulate the body's response to high acceleration environments.

The latest anthropometric data of AF personnel are used to develop sizing systems and programs for protective equipment to be worn by both AF men and women. Data from the AMRL Anthropometric Data Bank are used to develop design criteria for improved analogues of AF men assessing their reaction to hazardous environments and to identify the suitability of current female data to serve as the basis for the design of female analogues. Field tests of new systems will be used to develop standardized procedures for evaluating the engineering anthropometric suitability of new workstation geometries.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Aerospace Medical Research Lab.

6.0020, AEROSPACE MEDICINE RESIDENCY PROGRAM

Unknown, Wright State University, Graduate School, *Dayton, Ohio* 45431 (NGT 36-024-790)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

6.0021, DEVELOPMENT OF OFFICER TEST BATTERIES AND SELECTION PROCEDURES

R.B. Gould, U.S. Dept. of Defense, Air Force, Human Resources Lab., *Brooks Air Force Base, San Antonio, Texas* 78235 (DF231640)

To synthesize outcomes from the preceding work units under task 771912 and related research into officer test batteries and selection systems, to evaluate the effectiveness of such batteries and systems, and to provide a vehicle for experimentation with promising types of items or subtests.

An experimental selection test will be developed from academic, biographical, and interest content. Separate tests for the selection of student pilots and navigators will be similarly developed. Tests will be evaluated by multiple linear regression and other methods to determine their effectiveness as predictors of officer performance measures. Experimental items and subtests will be included in the tests for evaluation. Standardization populations will be investigated, and methods of using test scores in officer selection will be studied. As appropriate, effectiveness of the experimental batteries will be compared with that of the current battery.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Human Resources Lab.

6.0022, TRACE METALS CORRELATIONS

E.L. Arnold, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF321760)

To determine if the serum and/or urine concentrations of certain trace elements are correlated with incidence of coronary artery disease and to determine the metabolic role of elements with a positive correlation in the disease process. Elements of current interest are copper, zinc, chromium, cadmium and selenium.

Existing methods will be used to determine trace element concentrations in specimens obtained from patients seen by the Aeromedical Consultation Service who have undergone cardiac angiography. New procedures will be developed to allow measurement to those elements for which acceptable methods are not available. Statistical analysis will be performed as soon as sufficient data is available on any individual element.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0023, MAJCOMS AND BASE LEVEL SUPPORT

J.A. Boydstrun, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322000)

The objective of this work unit is to provide direct support to requestors for assistance through utilization of the existing aerospace medicine technology data base, the expertise of the Clinical Sciences Division staff, and where required, the expertise of USAFSAM resources outside of Clinical Sciences Division.

The approach to be utilized will involve initial Division staffing of the specific request to determine the full spectrum and scope of the endeavor, the individuals to participate in the evaluation and the assignment of OPR to a specific Clinical Sciences Division scientist. All available Division resources will be subject to utilization at one time or another including the various medical information files, the accumulated patient evaluation records from the Aeromedical Consultation Service, and also the accumulated years of aeromedical experience and judgment. Anticipated products will be summary of evaluations and analyses which may be in a simple letter reply, a USAFSAM technical Report, or published paper. This is a new-start work unit for fiscal year 1977.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0024, CHARACTERIZATION OF HYDROCARBON EMISSIONS FROM AF TURBINE ENGINES

J.P. Conkle, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF320850)

The efforts will provide baseline data for assessing the biomedical impact of Air Force aircraft operations, prior to the advent of regulatory restrictions. The information is required not only for assessing environmental impact but also for evaluating combustor design criteria, smoke suppression additives and engine operational cycles. The work is closely coupled and coordinated with ongoing turbine engine emissions measurement at the AFWL and AFAPL.

Chemical characterization of the organic compounds present in turbine engine exhaust will be accomplished for both gaseous and particulate species. Samples will be obtained from a variety of sources including AF and Navy operational engine test stands and the AFAPL single combustor test rig. Analysis will be performed by a coupled gas chromatograph-mass spectrometer data system. Results will be screened by AMRL/TH for toxic hazard assessment. Prior progress in this effort has been documented under work unit 7164-16-13. This new work unit implements new technology planning objective alignment as directed by HQ Aerospace Medical Division.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0025, BIOMEDICAL LIMITATIONS OF AIRCREWS IN HIGH-PERFORMANCE AIRCRAFT

H. Laughlin, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF319760)

This effort will determine the ability of the cardiovascular system to provide adequate organ perfusion throughout the body during exposure to high sustained acceleration. It has been demonstrated that exposure to operational levels of high sustained acceleration is associated with cardiac pathology in experimental animals, therefore the coronary circulation will be investigated first. The importance of coronary blood flow and local myocardial hypoxia in the development of acceleration-related cardiac pathology will be determined. The physiologic end points at which further acceleration will compromise adequate perfusion of the heart, brain, and kidney will be determined.

Miniature swine and subhuman primates will be used for these studies. The acceleration endpoints at which perfusion becomes inadequate in the various organs will be determined during the first exposure to operational acceleration levels. The same end points will be determined in another group of animals which have been conditioned to operational acceleration levels by repetitive exposure to acceleration over a period of 1-6 months.

This will provide a data base which can be used to determine the safe limits of acceleration exposure.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0026, MISSION-CREW EMPLOYMENT PROCEDURES AND SYSTEM EVALUATION FOR RIVET JOINT
W.F. Storm, U.S. Dept. of Defense, Air Force, School of Aerospace Medicine, *Brooks Air Force Base, San Antonio, Texas* 78235 (DF322190)

The primary goals of USAFSS rivet joint modernization are (1) to better interface with tactical command control communications (C3) elements by closing the tactical loop communication system and (2) to improve manpower utilization. Both goals are accomplished through use of automated, computerized search and acquisition systems. These new systems permit more airborne time for data analysis and intelligence production. They also require new modes of operation, new skills, and increased workloads for the mission crews. Baseline data are not available on the ability of operators to manage the modernized, high-speed, console stations. The objective of this work unit is to determine the psychological and physiological stresses on the mission crewmembers due to environmental conditions and interaction with the new system. Equipment/console design, crew accommodations, and environmental conditions of the aircraft will also be evaluated.

This evaluation will employ the USAFSAM stress battery, relying on behavioral and physiological indices to determine operator/crew rest requirements and crew performance problems related to inflight environment and workload. Using questionnaires and critical incident surveys, the suitability of equipment location for use and repair will be determined, configurations which are injurious to crewmembers during stable and/or unstable flight will be identified, and comfort/fatigue factors such as temperature, noise, and vibration will be evaluated. Portions of this effort were previously documented under 7930-09-11 and 7930-10-06.

SUPPORTED BY U.S. Dept. of Defense, Air Force, School of Aerospace Medicine

6.0027, NEURAL INVOLVEMENT IN THE CARDIOVASCULAR ADJUSTMENT TO STRESS
V.S. Bishop, University of Texas, Health Science Center at San Antonio, South Texas Medical School, Dept. of Pharmacology, *7703 Floyd Curl Dr., San Antonio, Texas* 78284 (DF036860; AFOSR-78-3657)

AF function - the AF must perform its mission under conditions which expose personnel to a number of environmental and psychological stresses including temperature extremes, varying oxygen tensions, maneuvering forces, fatigue and prolonged flights across several time zones. The circulatory system is one of the physiological systems which early shows operator malfunction due to such stress. An indicator for predicting performance reliability of the individual under stress has long been sought. Deficiency - little is known about the role of the cardiopulmonary receptors in the regulation of heart rate and peripheral vascular resistance. Objective - this study will examine the effects of stress on the cardiovascular system as may be affected by neural involvement. How work contributes - these data should assist in developing an understanding of the basic mechanisms of adaptation to environmental stresses and contribute to needed technology for enhancement of operator performance and safety. This research supports SA 1.5, 'Aerospace Medicine' and 1.8, 'Aircrew Safety and Effectiveness in Mechanical Force Environments.'

It is proposed to thoroughly investigate compensation provided by neural reflexes during stress using chonically instrumented animal subjects.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

6.0028, EFFECT OF WEIGHTLESSNESS ON BODY MASS AND ORGAN MASS AND COMPOSITION IN THE RAT
G.C. Pitts, University of Virginia, School of Medicine, Dept. of Physiology, *Box 246, Charlottesville, Virginia* 22901 (NAS 2-10195)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

6.0029, CODING, ORGANIZATION, AND FEEDBACK IN MOTOR SKILLS
G.E. Stelmach, University of Wisconsin, Madison Campus, School of Education, Dept. of Physical Education For Men, *104 Education Bldg., Madison, Wisconsin* 53706 (DF053480; AFOSR-78-3691)

AF function - this research supports the AF flying training program and all other programs involving the training of motor skills and coordination. Deficiency - traditionally the piloting activity has been viewed as 'eye-hand' coordination which was assumed to be a mechanistic type of motor movement. Such a view has lead to extensive investigation of simple motor control movements as an end in themselves, with substantial modeling of these motor behaviors into elaborate mathematical descriptions of the operator. The deficiency in this approach is that the higher cognitive processes, which probably account for a large proportion of psychomotor skills, are never studied. The complicated behavior of the pilot controlling a sophisticated aircraft, therefore, can never advance beyond the simple concept of 'eye-hand' coordination. Objective - this research will study higher cognitive functioning and will provide knowledge about the registering, storing, and utilization of cognitive information in a variety of motor situations. How research contributes - knowledge about motor behavior can be used to design better training techniques for motor skills. This has application for teaching complex aircraft control skills in flight training, for example in air combat maneuvering.

A three-phase program of research is planned - the coding of movement information, the organization of information input, and the contribution of feedback modalities to the memory representative of movement. The coding of movement information investigates contradictory theories (the proprioceptive location cue vs. central monitoring of efference) of how a particular movement is encoded into memory. The organization of information input examines how the operator organizes large blocks of information into channels which are easily stored and retrieved, such as complex motor tasks. The work on feedback modalities looks at instructional strategies by which feedback mechanisms are designed.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

MATHEMATICAL AND COMPUTER SCIENCES

Includes Mathematical and Computer Sciences (general); Computer Operations and Hardware; Computer Programming and Software; Computer Systems; Cybernetics; Numerical Analysis; Statistics and Probability; Systems Analysis; and Theoretical Mathematics.

7.0001, DESIGN OF A COMBINATORIAL COMPUTER
P.N. Armstrong, (No Performing Organization Reported), *California* (DN875379; N00014-78-C-0357)

A great many computations which are necessary or desirable for the solution of Navy engineering problems cannot be carried out in a satisfactory way because of limitations in processing power of currently available computers. Many of these computations, for example fluid dynamics calculations for ship and aircraft design and mathematical programming calculations for the solution of various logistics problems, will not be solvable even on the computers available in the 1980's. These commercially available 1980's computers are already largely designed. This project will investigate computer designs, based on a new memory concept, which show promise for greatly augmenting computational power (compared to conventional random access memory).

The investigators will look at a number of important computations of a combinatorial nature with the aim of designing a computer architecture, based on a 'self-sorting memory' (SSM), for the efficient solution of these problems. The SSM is less expensive than random access memory, but has built-in processing power which should be usable to greatly speed the solution of sparse matrix, transportation, linear programming, and various graph theoretic problems.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

7.0002, MIXED KERNEL FUNCTION METHOD FOR UNSTEADY TRANSONIC FLOW CALCULATIONS
D.D. Liu, Northrop Corp., *3901 W. Broadway, Hawthorne, California* 90250 (DF137390; F33615-78-C-3202)

This work unit supports the area of transonic flutter prediction. Establishing flight flutter safety for military aircraft is presently difficult and costly for the transonic speed regime. The objective of this effort is to provide an efficient and accurate transonic flutter prediction method. Increased confidence and reduced costs are expected for establishing flight flutter safety in the transonic flight region.

Develop and demonstrate a unified method for unsteady flow in the subsonic/transonic/supersonic regimes based on the 'mixed kernel function' method.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Flight Dynamics Lab.

7.0003, JOINT DESIGN AND DEVELOPMENT OF INTERACTIVE GRAPHICS EDITOR
W.M. VanCleemput, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (NCA 2-745903)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

7.0004, GRAPH ALGORITHMS - KEY TO IMPROVED COMPUTING METHODS IN ENGINEERING PROBLEMS
R.E. Tarjan, Stanford University, School of Humanities & Sciences, Dept. of Computer Science, *Stanford, California* 94305 (DN675391; N00014-76-C-0688)

After the calculus, the single most important concept in modelling engineering design and particularly operations analysis problems is the concept of a graph (a collection of 'nodes' connected by 'edges'). Graphs are used, and graph theoretic algorithms must be devised in electronic circuit design, the design of both communications and logistics networks, the analysis of a great variety of computational algorithms (e.g., for information retrieval), and the flow analysis of the computer programs which implement these algorithms. Graph theoretic notions have recently become very important in the study of techniques for the solution of sparse matrix problems. Sparse matrix techniques are often the key to the solution of important Navy fluid dynamics problems, both problems of geophysical fluid mechanics (weather and oceanographic modelling) and fluid problems arising in ship and aircraft design. This project will develop improved computer procedures for the solution of the graph problems generated in the above applications.

This effort will develop general methods which can be applied to the efficient solution of a variety of specific graph problems. The project will also apply these general methods to specific problems. In addition, analyses of the relative computational efficiency of various algorithms will be carried out.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

7.0005, CONTROL AND COMMUNICATION SYSTEMS APPLICABLE TO THE DESIGN OF AEROSPACE SYSTEMS
A.V. Balakrishnan, University of California, Los Angeles Campus, School of Letters & Science, Dept. of Mathematics, *405 Hilgard Ave., Los Angeles, California* 90024 (DF051350; AFOSR-78-3550)

AF function - design of advanced aircraft control systems. Deficiency - the unification of the separate efforts in structures, aerodynamics, stability and control and propulsion is needed in early design phases. Objective - the objectives of this research are the development of efficient computing algorithms for optimal trajectories based upon the epsilon techniques, the development of theory and techniques for determining stability derivatives of aircraft based on measurements in flight which include wind-gust effects and design of a stability augmentation system thereof and the development of a theory of flutter suppression windgust alleviation for flexible aircraft using distributed parametric models. How work contributes - success in these objectives would contribute to the design of high-performance variable geometry aircraft control systems.

The unification of separate efforts of aircraft design will be pursued using extended techniques to include systems with state space of non-finite dimension (including partial differential equations). The transient and steady-state responses and the overall unsteady aerodynamic-aeroelastic problem will be treated as a whole rather than separate entities. A systematic theory of control of uncertain systems -systems that suddenly change parameters - will be developed based on the new formulation of such problems using Markow time theory. The application of 'white-noise' theory will be developed for the problem of systems where one-dimensional time is replaced by n-dimensional Euclidean space. The theory of state space of non-finite dimension will be investigated for the associated 'system-theory' problem.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0006, STRUCTURE OF MATERIALS, ELECTROMAGNETIC SCATTERING AND FLUID DYNAMICS
R.P. Gilbert, University of Delaware, School of Arts & Sciences, Dept. of Mathematics, *Newark, Delaware* 19711 (DF041300; AFOSR-76-2879)

AF function - design of aerospace vehicles. Deficiency - more critical design criteria require more exact evaluation involving additional physical effects. Objective - increased understanding of the equations of fuel tank oscillations, aircraft panel flutter, structural stability and vibration, etc. How work contributes - improved analysis of these less familiar models may suggest methods of control.

The above problems involve boundary value problems for relatively unfamiliar higher order partial differential equation. Fundamental solutions, generated by more familiar lower order techniques when the equation is cast in a certain matrix form, can be used to obtain boundary integral equations. Study of the fundamental solutions of linear problems not only suggests possibly useful physical properties but is also important to the solution of the boundary integral equations even when certain nonlinearities occur and invariant imbedding techniques must be used. Selected prototype problems will be addressed by these techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0007, A STUDY OF WAVE AND BOUNDARY LAYER PHENOMENA IN FLUID SYSTEMS
H.P. Greenspan, Massachusetts Inst. of Technology, School of Science, Dept. of Mathematics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (DF047210; AFOSR-77-3234)

AF function - aerospace vehicle design and operation. Opportunity nonlinear fluid flow effects suggest new techniques for design and explanation of flow phenomena. Objective - an understanding of nonlinear fluid motions anu their physical and technological implications. How work contributes - by suggestive examples exhibiting and quantifying relevant nonintuitive effects.

The several approximations to the nonlinear partial differential equations of viscous fluid flow are treated analytically, by boundary layer techniques and numerically to obtain solutions to boundary value problems which model transition to turbulence, wave interactions, instability and separation in a rotating fluid, stratified flows, waves on deformable boundaries, droplet behavior and storage tank rupture.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0008, BODIES OF TRANSLATION

L. Mitschang, McDonnell Douglas Astronautics Co., *E. 411 St., St. Louis, Missouri* 63166 (DF737540; F30602-77-C-0233)

The objective of this program is to develop an analytical technology which will be used to characterize the electromagnetic behavior of structures having a constant cross-sectional geometry (similar to an aircraft wing, tail, or fin). The structures of interest are those composed of finite conducting material. They will have maximum dimensions of 20 wavelengths in length and 10 wavelengths in perimeter. This technology will be used to develop a computer program with the capability of modeling these structures. It will also calculate the near and far electric and magnetic fields radiated or scattered from them, as well as the current distribution.

A numerical technique will be developed which will model the desired structure and predict its electromagnetic behavior. This technique will then be developed into a user-oriented computer code and implemented on the RADC computer. The computer code will be debugged and documented, provided in the form of a user's manual and a code documentation manual.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

7.0009, THE STABILITY AND DYNAMICS OF ELASTIC STRUCTURES AND WAVE PROPAGATION

E.L. Reiss, New York University, School of Arts & Sciences, Dept. of Mathematics, *421 1st Ave., New York, New York* 10012 (DF044940; AFOSR-76-3076)

AF function - to design stable aerospace structures. Opportunity -a new mathematical approach to buckling in the presence of imperfections and to secondary buckling. Objective - a safer, lighter, more efficient structure. How work contributes - original techniques for predicting catastrophic and secondary buckling and flutter.

Asymptotic techniques of stretching and matching yield nonsingular equations which extend bifurcation theory. This extended theory will be explored in the contexts of buckling with imperfections, secondary buckling, and nonlinear dynamic stability. Possible directions of research include extension of the theory to the more imperfection sensitive bifurcation points of higher multiplicity, periodic and quasi-periodic fluid structure interaction such as aircraft panel flutter, a statistical theory of bifurcation permitting direct determination of statistics, forced oscillation of nonlinear systems, and laminar flow transition to turbulence or chaos. Work on wave propagation in thin elastic structures, and nonlinear wave motion in air will be explored also by asymptotic techniques.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0010, REAL TIME IMAGE PROCESSING ALGORITHMS

G. Jarvis, Pattern Analysis Recognition Corp., *310 E. Chestnut St., Rome, New York* 13440 (DF911340; F30602-78-C-0105)

The objective of this effort will be to develop the required algorithms for application of real time radar processing techniques in wideband image classification of unknown aircraft. This effort will determine the hardware sizing, applicable algorithms required and will demonstrate their feasibility. The requirement for positive identification of unknown high-speed tactical targets is a sensitive and critical need for air supremacy in a hostile environment. The development of real time high-resolution data processing algorithms for aircraft identification via ground-based tactical radars and applicable data processing systems will provide the necessary inputs to develop an effective real time radar imaging system. Previous efforts by RADC have demonstrated the feasibility of real time radar imagery. However, actual software development for the demonstration of real time radar imagery has been restricted by motion compensation solutions, real time data processing applications requirements of unknown targets.

The approach will include the development and implementation of the necessary algorithms to solve the motion compensation, cross-range scaling, problem for the real time mimi-configured system. This task may be solved by establishing a proficient intramodule communication/data flow which would effect serial/parallel processing with host/slave peripherals to obtain the high speed and computing power required to implement the algorithms for real time imagery. Considerations of multi-sensor imputs which include bistatic radars, HUMINT, CLINT, IFF and their impact on the data processing task should also be evaluated. Identification of specialized peripheral hardware such as arithmetic array processors, high-speed data transfer discs and high-speed memories should be evaluated for effective implementation and trade-offs.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Rome Air Development Center

7.0011, IGNITION, COMBUSTION, DETONATION, AND ARRESTING OF UNCONFINED AND CONFINED REACTIVE MIXTURES

R. Edse, Ohio State University, Columbus Campus, School of Engineering, Dept. of Aeronautical & Astronaut Engin, *190 N. Oval Dr., Columbus, Ohio* 43210 (DF052430; AFOSR-78-3604)

AF function - advanced chemical explosive weapons, weapon delivery and defense, close air support, aircraft component vulnerability and survivability. Deficiency - insufficient understanding of the basic mechanisms and dynamic processes of initiation, propagation, attenuation and quenching of blast waves, flames and detonations in reactive media and lack of realistic guidelines for predicting properties and blast damage potentials of unconfined homogeneous and heterogeneous explosions and effectiveness of flame/detonation quenching techniques. Objective -to formulate mathematical models realistically describing the mechanisms responsible for initiation, propagation, attenuation and quenching of blast waves, flames, and detonations in reactive media. How work contributes - will provide additional understanding of, and analytical models realistically describing initiation, propagation, attenuation and quenching mechanisms of blast waves, flames and detonations in reactive media not now available, and will contribute to establishing realistic guidelines for developing unique high-power explosive devices and effective flame and detonation arrestors.

Fundamental mechanisms and processes of phenomena associated with initiation, propagation and arresting of flames and detonations in unconfined and confined reactive mixtures will be studied. Included will be study of (a) spontaneous detonative decomposition and high-intensity explosions of endothermic compounds (e.g., acetylene), (b) spontaneous ignition and detonations in unconfined powderized metal fuel - and cryogenic fuel-oxidizer mixtures, (c) initiation and propagation of flames and transition to detonation as a function of initial conditions (e.g., initial temperature, unburned gas density, initial flame volume), igniter energy density and externally induced turbulence, (d) blast wave flame and detonation wave attenuation and quenching in static and flowing reactive mixtures including effects of flow velocity, geometry, material (heat conduction, catalyst, inert gas) and sudden expansion on the quenching process. Theoretical models and analytical relationships will be formulated describing the phenomena involved and correlated with experimental results.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0012, STATISTICAL TECHNIQUES FOR SIGNAL PROCESSING

S.A. Kassam, University of Pennsylvania, School of Engineering & Applied Sciences, Dept. of Systems Engineering, *4001 Spruce, Philadelphia, Pennsylvania* 19104 (DF046510; AFOSR-77-3154)

AF function - communications and signal processing. Deficiency -there exists a definite need for research in the area of nonparametric and robust statistical techniques which will result in simple and effective tests applicable to practical problems in communication and signal detection and processing. Objective - develop nonparametric and robust testing techniques which can maintain performance at some predetermined level for large classes of probability distribution functions. How work contributes - this research should lead to better design of communication systems and signal processing techniques.

The proposed research will be continued in the area of nonparametric and robust statistical hypothesis tests for signal detection. A new area of the proposed research is the study of distance measures and their application in the design of optimal systems, especially for hypothesis testing. Distance-measure concepts appear to hold considerable promise for useful results applicable to array processors and quantized data systems. It is also proposed to focus attention on sequential testing with particular emphasis on conditional test structures. Also a study will be made of the problem of correlated data for nonparametric hypothesis testing.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

7.0013, NUMERICAL ANALYSIS OF FLOW IN CONNECTING PASSAGE BETWEEN FAN SECTION AND HIGH-PRESSURE SECTION OF A TURBOJET ENGINE
A.L. Goldman, Texas Tech University, Graduate School, *251 Administration Bldg., Lubbock, Texas* 79409 (DF051600; AFOSR-78-3561)

AF function - advanced turbomachinery. Opportunity - improve calculation methods for flow fields within passageways of arbitrary geometries. Objective - develop a numberical method which may be used to investigate the flow field in an arbitrarily shaped channel in a jet engine. How work contributes - will provide a more efficient method for determining flow geometries and operating conditions within a jet engine passageway.

The general method used for obtaining the flow field will be to finite difference the appropriate equations, with the program of work requiring the successful completion of four tasks. The first task will be to determine what are the appropriate equations to use. Task two will be to construct a coordinate system which may be used with arbitrary channel geometries. The third task will be to model the Reynolds stresses arising from the turbulent flow. Finally, the last task is to solve this set of equations. Solutions will be obtained for both a 2-D and an axisymmetric model.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

PHYSICS

Includes Physics (general); Acoustics; Atomic and Molecular Physics; Nuclear and High-energy Physics; Optics; Plasma Physics; Solid-state Physics; Thermodynamics and Statistical Physics. For Related Information See Also Engineering.

8.0001, RESEARCH IN SOLID-STATE ELECTRONICS 14749-EL
R.W. Gould, California Inst. of Technology, Graduate School, Dept. of Applied Physics, *1201 E. California Blvd., Pasadena, California* 91109 (DA0F8958; DAAG29 77 C 0015)

Research to understand the physics, and to structurally and electronically characterize different layers of electronically active materials. The research will focus on interfaces between and surfaces of semiconducting materials. Relevance - a major portion of the electronic devices used in Army applications are derived from multilayers or heterojunctions of electronically active materials. This program will effectively contribute to the very important science and technology base of integrated circuits, millimeter- and micro-wave devices and night vision systems.

A theoretical and experimental investigation of (1) properties of abrupt GaAs/AlAs interfaces theoretically by LCAO (linear combination of atomic orbitals) treatment and experimentally by optical means, (2) low-temperature epitaxial micro transport growth and characterization of heterojunctions, and (3) properties of surface layers exposed to ion implantation by channeling backscatter spectroscopy.

SUPPORTED BY U.S. Dept. of Defense, Army Materiel Development & Readiness Command, Army Research Office

8.0002, EPITAXIAL GARNETS AND HEXAGONAL FERRITES
H.L. Glass, Rockwell International Corp., *3370 Miraloma Ave., Anaheim, California* 92803 (DF040600; F44620-75-C-0045)

AF function - microwave electronic components are essential elements of Air Force communications, reconnaissance, surveillance and countermeasures systems. Opportunity - improved performance can be expected from the use of new solid-state materials for processing microwave signals. Present microwave solid-state signal processing devices which utilize surface acoustic waves (SAW) cannot operate at frequencies greater than a few hundred mHz without encountering difficulties. These difficulties, which include high attenuation and extremely small transducer geometries, are compounded by poor coupling efficiency from electromagnetic to acoustic energy. Objective - the objective of this research is to develop epitaxial layers of yttrium-iron-garnet (YIG) and hexagonal ferrites for utilization in magnetostatic surface wave signal processing devices that operate in the 1 to 25 gHz and 25 - 60 gHz frequency range, respectively. How work contributes - the research involves the growth and characterization of epitaxial, low-loss, temperature compensated YIG films and device quality hexagonal ferrite epitaxial layers.

The main effort in epitaxial YIG for the current year will be the growth, characterization and analysis of complex layered structures. A mathematical model will be used as a guide to selecting the most appropriate parameters for various multilayered structures. Several layers of YIG will then be grown, each with a different resonant frequency. This resonance shift will be accomplished by incorporating differing amounts of Pb into the films and it is expected that a larger effect will take place with La and Ga substitutions. Considerable progress has been made in the growth of the hexagonal ferrites. So far, the M, Zn2Y and Zn2W types have been grown and work will continue in order to establish the growth stability ranges for these three types as well as to determine conditions for the growth of other hexagonal ferrite types and combinations. Finally, one hexagonal ferrite type, probably M, will be optimized for filtering applications at frequencies above 40 gHz. Substitutions of Zn, Ti and Mn into the lattice will be used in order to optimize the filtering parameters.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0003, SURVEILLANCE - ADVANCED LASER SOURCES
A.L. Schawlow, Stanford University, School of Humanities & Sciences, Dept. of Physics, *Stanford, California* 94305 (DN875317; N00014-78-C-0403)

The Navy requires an improved understanding of the principles and associated technology of advanced laser sources in order to evaluate potential applications. The objective of this work is to provide a diversified program of research on the basic physics and demonstration technology of a variety of advanced laser sources. Technological applications will not be directly addressed.

The following approaches will be considered: (1) new techniques will be developed for ultrahigh resolution UV laser spectroscopy; (2) very fast energy extraction techniques will be developed and applied to metastable systems as a means for producing VUV and soft X-ray lasers; (3) several novel schemes using electron beams and including the free electron laser will be investigated as sources for producing intense tunable monochromatic radiation in the visible to X-ray region; (4) laser-induced fluorescence will be used to study the energy states of state selected molecules scattered at solid surfaces.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0004, THEORETICAL STUDY OF NONLINEAR AND COLLECTIVE EFFECTS IN UNSTABLE PLASMAS
B.D. Fried, University of California, Los Angeles Campus, School of Letters & Science, Dept. of Physics, *405 Hilgard Ave., Los Angeles, California* 90024 (DN524497; N00014-75-C-0476)

Conduct research on nonlinear and collective effects in unstable plasmas for naval applications to ballistic missile effects, atomic weapons effects, communications, and energy conversion systems. This work includes investigations of ponderomotive force effects to antenna structures immersed in plasmas, nonlinear evolution of electron beams driven by external DC electric fields, and the properties of a plasma with truncated distribution functions.

Theoretical and numerical studies consist of isolating specific nonlinear processes that give rise to large effects which can be observed in laboratory plasmas. These studies play the dual role of suggesting new nonlinear experiments as well as explaining the outcome of naval experiments in which previously unexpected nonlinear phenomena are often found. The salient results obtained by this approach are used to understand the complexities involved in plasma heating as well as in the interaction of intense radiation plasmas.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0005, APPLICATIONS OF THE TWO-DIMENSIONAL MODEL OF THE VENUS IONOSPHERE

P.T. McCormick, University of Santa Clara, School of Science, Dept. of Physics, *El Camino Rd., Santa Clara, California* 95053 (NCA 2-685906)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

8.0006, INVESTIGATIONS OF IMPURITY CONCENTRATIONS AND ELECTRONIC PROPERTIES OF SEMICONDUCTORS NEAR INTERFACES

D.B. Wittry, University of Southern California, School of Engineering, Dept. of Electrical Engineering, *3551 University Ave., Los Angeles, California* 90007 (DF049770; AFOSR-77-3419)

AF function - microwave solid-state electronic devices are essential components of Air Force surveillance, electronic countermeasures and communications systems. Deficiency - GaAs and InP are presently the most promising materials for these solid-state devices and many devices are fabricated by growing epitaxial layers on substrate of essentially the same material. Typically, however, the impurity concentration of the epitaxy and the substrate are different and it is this interface region which is not understood. An understanding of this interface region is necessary in order to correctly predict and control the performance of devices utilizing the epi/substrate structure. Objective - the objectives of this research are to determine the concentration of impurities in GaAs or InP substrates near the substrate/epilayer interface and to investigate the electronic properties of semiconducting substrates of GaAs and InP near this interface. How work contributes - this work will contribute to a better understanding of III-V semiconductor device performance by obtaining more knowledge concerning the epilayer/substrate interface region of these devices.

The initial portions of this work will deal with GaAs and be expanded to InP at a later date. In addition to studying the GaAs (InP) - epilayer on GaAs (InP) substrate, samples of GaAs or InP without epilayers will be subjected to various heat treatments in an effort to obtain a better understanding of how the loss of one of the atomic components affects interfacial impurity concentrations. Four experimental techniques will be used in this effort to first determine the nature of the defects and impurities which are present and then understand the reasons for the presence and formation of these defects and impurities. Both sputtered ion mass spectroscopy and electron probe X-ray microanalysis will be used to determine impurity concentrations in the interface region. Room-temperature scanning cathodoluminescence microscopy will be employed to determine the influence of impurity concentration variation on radiative recombination of excess carriers while low-temperature cathodoluminescence will be used to determine the energy levels of the interfacial impurities. Finally, electron beam induced currents on angle specimens will be used to indicate the presence of p-n junctions and to provide information on minority carrier diffusion lengths near the interface.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0007, THE ACOUSTIC EMISSION FROM CRYSTALLINE MATERIALS

S.H. Carpenter, University of Denver, School of Engineering, Dept. of Metallurgy, *2115 S. University Blvd., Denver, Colorado* 80210 (DF049530; AFOSR-77-3395)

AF function - aircraft structures subject to static and dynamic loads are vulnerable to the initiation and growth of defects (e.g. cracks) which may lead to structural failures. Opportunity - often the growth of these defects gives rise to acoustic emission which can be detected and analyzed to provide a nondestructive evaluation (NDE) of the severity of the defect growth. Objective - the objective of this research is to correlate the characteristics of the acoustic signal to the type and severity of the defect origin. How work contributes -acoustic emission is a particularly desirable (NDE) concept because the growing defect 'calls out' its location, and one does not have to search for the defect.

The characteristics (e.g. wave shape, frequency components, amplitudes, etc.) of the acoustic emission will be related to the structural and metallurgical properties of the material and to the effect of stress states acting on the defect. Verification that a particular source is responsible for a characteristic signal will be obtained from other independent measurements.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0008, GRAVITATIONAL PHYSICS AND RELATIVISTIC ASTROPHYSICS

S. Chandrasekhar, University of Chicago, School of Physical Sciences, Dept. of Nuclear Studies, *5801 S. Ellis Ave., Chicago, Illinois* 60637 (PHY7824275)

Research in theoretical gravitational physics currently supported under NSF grant PHY76-81102 AO1 will be continued. Among the topics to be investigated are.

CHANDRASEKHAR: 1. Metric perturbations of the Reissner-Nordstrum black holes; 2. Separation variables for the equations governing perturbations of the Kerr-Newman black hole.

GEROCH: 1. Stability of asymptotic simplicity: 2. Total angular momentum at null infinity; 3. Positive energy conjecture.

IPSER: 1. Distribution of stars around massive black holes: 2. Nonspherical star clusters in general relativity; 3. Nonaxisymmetric rotating fluids in gravitational equilibrium; 4. Stellar-dynamical processes in stellar systems; 5. Differentially rotating objects.

WALD: 1. S-matrix for particle production by gravitational fields; 2. Renormalization for quantum field theory in curved space-time; 3. Semiclassical approximation to quantum field theory; 4. Solutions to perturbation equations.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0009, PROPERTIES OF SOLIDS AND MANY-PARTICLE SYSTEMS

G.A. Baym, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Physics, *Urbana, Illinois* 61801 (DMR7821069)

Research previously supported by DMR7522241.

Theoretical research will be carried out on a number of topics: (1) Spin-glasses, including the question of the existence (or non-existence) of ordering in three dimensions and the adequacy of the Edwards-Anderson model. (2) Amorphous and random magnetic systems, in which percolation effects may be important. (3) Magnetic interfaces between domains in a ferromagnet. (4) Excitations in disordered systems, including the study of critical localization and mobility edges. (5) Liquid helium, which will involve the study of ion mobilities in superfluid He-3, mixtures of He-3 and He-4 and the hydrodynamic behavior of rotating He-4 superfluids. (6) Properties of matter at high densities, such as the investigation of pion condensation and the phase transition from nucleon matter to quark matter. (7) Dynamical behavior of neutron stars and supernovae.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0010, EXPERIMENTAL STUDIES OF ION CHARGE AND ION FLUX IN STREAMING PLASMAS

D.W. Koopman, University of Maryland, College Park Campus, Inst. for Physical Science & Technology, *College Park, Maryland* 20742 (DF033820; AFOSR-76-2991)

AF function - considerable damage and incapacitation of equipment may result from laser irradiation and from a nuclear detonation. These deleterious effects may be drastically decreased and even eliminated by suitable design. Deficiency - the design characteristics of protection devices are not well known. In the case of nuclear detonations the SALT agreements prohibit nuclear testing; consequently, the required data can be obtained only by simulation techniques. Objective - this research will study highly ionized plasma flows produced by laser irradiation of target materials and the interaction of these plasmas with neutral and ionized backgrounds. Three objectives may be mentioned: (a) collisio nal momentum transfer, (b) magnetized plasma interactions including the production of experimental data describing the expansion processes in the laser-produced plasmas, (c) comparison of the experimental and theoretical results as well as predictions, yielding improved understanding of the plasma flow dynamics. Contribution - this research is a part of a comprehensive program for the development of an X-radiation source for simulation of nuclear weapon effects, the development of advanced electromagnetic weapons (laser and particle beam), the development of space and ionospheric communications, and countermeasures.

This research is both theoretical and experimental, and it will investigate and elucidate the dynamics of flowing and interacting plasmas and gases with an emphasis on the processes which transfer momentum between ion species within the flow. It will perform measurements employing the resonant optical diagnostic technique previously developed with an extension to holographic as well as Schlieren and absorption recording of plasma flow patterns. In addition, it will investigate the recently discovered turbulent interaction region which is responsible for the development of shocklike momentum coupling fronts. The existing installation was modified in such a way as to add a variable magnetic field to the plasma flow region. It will thus examine flow regimes which are collisionless and will attempt to verify the mechanisms of two-stream instability which have been predicted by the theory. The optical diagnostic measurements of ion flow behavior will extend to the density range of 10 to the 20 per cubic meter by fluorescent optical scattering at the ion resonant wavelength. (Text Abridged.)

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0011, HIGH-RESOLUTION VACUUM ULTRAVIOLET SPECTROSCOPY OF SMALL MOLECULES

W.H. Parkinson, Harvard University, Cambridge Campus, School of Arts & Sciences, Dept. of Physics, *Cambridge Station, Cambridge, Massachusetts* 02138 (DF045930; F49620-77-C-0010)

AF function - surveillance, detection and communications, laser development in the near UV region of the spectrum. Deficiency - there is a lack of sufficient data to characterize the degree of photopredissociation of N2 in the upper atmosphere. Adequate understanding is lacking of the detailed spectroscopy and dynamics of rare gas excimers which can act as VUV lasers or energy storage states for transfer to the upper laser level of other species. Objective -determine photopredissociation processes in N2 at 800-1000 Angstroms and determine high-resolution vacuum ultraviolet spectroscopy of Van der Waals molecules. How work contributes - a high-resolution spectroscopic investigation of the photopredissociation of N2 as a source of excited N(2D) atoms is important in determining the amount of vibrationally excited NO molecules in the upper atmosphere which are produced by reaction of N(2D) with 02. The lowest excited electronic states of the Van der Waals molecules such as the diatomic rare gas molecules are important to the development of intense VUV sources and lasers. Spectroscopic investigation of these molecules will establish important structural features of the molecules.

A 6.6 metre vacuum ultraviolet spectrograph with extremely high resolution will be used to study (a) photopredissociation processes in N2 by examination of the VUV absorption and emission spectra of nitrogen isomers, and (b) the spectroscopy of Van der Waals molecules which possess laser potential in the VUV and UV regions.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0012, CATOPTRIC X-RAY OPTICAL SYSTEMS

J.F. McGee, St. Louis University, School of Arts & Sciences, Dept. of Physics, *221 N. Grand Blvd., St. Louis, Missouri* 63103 (DF050630; AFOSR-78-3480)

AF function - operation of high-altitude vehicles in a post-nuclear explosion environment, development of electromagnetic weapons, space and ionospheric communications as well as countermeasures demand fundamental understanding of the various radiation processes occurring in plasmas. Deficiency - this aforementioned information required to design advanced equipment is not available today. Its acquisition may be realized by experimental work requiring advanced X-ray instrumentation. Objective - this project will perform theoretical and experimental research for the development of a compound catoptric X-ray microscope having both high resolution and large magnification. Contribution - this work is a part of a comprehensive program of plasma research for the development of an X-ray radiation source for simulation of nuclear weapon effects, the development of advanced electromagnetic weapons (laser and particle beam), the development of space and ionospheric communications, and the development of countermeasures.

This project will perform theoretical and experimental research for the development of a prototype 'compound' catoptric X-ray microscope which will have high resolution and large magnification. This will accordingly reduce the resolution requirements of the recording film or associated X-ray image intensifier. It would be distinguished by its 'large working distance'. To reduce further the resolution to its theoretical limit a thorough understanding of the aberration coefficients peculiar to focusing X-rays at grazing angles should be developed. There is always the possibility of using one aberration coefficient to counteract another and thus achieve an overall reduction of aberrations and increased resolution. Earlier X-ray microscopes had a resolution limit of approximately 3000 Angstroms and a very limited field of view. Current research suggests that a resolution of 500 Angstroms and a 2000 micron field of view is possible. Confirming experiments in the long wavelength region (10 Angstroms) are in progress.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0013, NON-DESTRUCTIVE EVALUATION OF COMPOSITE STRUCTURES USING FOURIER ANALYSIS OF ULTRASONIC SIGNALS

J.G. Miller, Washington University, School of Arts & Sciences, Dept. of Physics, *4559 Scott Ave., St. Louis, Missouri* 63130 (NSG 1601)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

8.0014, COSMIC RAY EXPERIMENT DATA ANALYSIS AND INTERPRETATION

L.A. Fisk, University System of New Hampshire, Graduate School, *Durham, New Hampshire* 03824 (NAS 5-25642)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

8.0015, IMPROVEMENT OF GAAS CRYSTAL QUALITY

W. Tantraporn, General Electric Co., *1 River Rd., Schenectady, New York* 12305 (DF049240; F49620-77-C-0105)

AF function - microwave solid-state electronic devices are essential components of Air Force surveillance, electronic countermeasure, and communications systems. Deficiency - the performance of GaAs microwave devices is being limited by the poor quality of the GaAs substrates used in the epitaxial growth process. The high defect density of these substrates causes high noise in microwave field effect transistors and possible complete failure in Impatt devices. Objective - the objective of this research is to develop a method of growing GaAs boules which will consistently and uniformly yield GaAs substrates of a quality superior to that now available. How work contributes - an improved sub-

strate material will allow GaAs microwave devices to achieve higher performance levels than those now possible and thus enhance Air Force systems employing these devices.

The main idea behind this research lies in the fact that most GaAs substrates available today are grown by methods, Bridgman or Czochralski techniques, in which the liquid-solid interface is liquid-convex. This configuration leads to defect migration from the surface into the bulk of the ingot and hence concentrates the number of defects in the main part of the boule. In addition, since solid GaAs is less dense than the liquid, the liquid-convex surface results in high compressional strain, another defect source in GaAs. In this research temperature gradients from a specially designed furnace will be used to control the liquid-solid interface and obtain a solid-convex surface. This interface shape will help to propagate defects out of the bulk and also aid in the reduction of possible elimination of compressional strain. The defects of slices in the boule will be determined by etch-pit density counts. The etch-pit density will be correlated with various radii-of-curvature for the solid convex surface.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0016, BASIC RESEARCH IN SUNSPOT DYNAMICS
J.H. Thomas, University of Rochester, School of Engineering & Applied Science, Dept. of Mechanical & Aerospace Science, *260 Crittenden Blvd., Rochester, New York* 14627 (NSG 7562)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

8.0017, COLLABORATIVE RESEARCH ON NUCLEAR PHYSICS AT INTERMEDIATE ENERGIES
D.K. McDaniels, Oregon State Higher Education System, University of Oregon, School of Liberal Arts, Dept. of Physics, *1472 Kincaid St., Eugene, Oregon* 97401 (PHY7681858A02)

Inelastic proton scattering studies will be conducted at 800 MeV using the High-Resolution Spectrometer at LAMPF and at 200-550 MeV using polarized protons and a magnetic spectrometer presently being developed at TRIUMF. Information is sought on the effective interaction to be used in the analysis of proton interactions with nuclei and on the aspects of nuclear structure which are best studied using medium-energy protons.

In addition the group will collaborate with Oregon State University in a wide-ranging program to study pion interaction with nuclei.

This work is a continuation of that previously supported under Foundation grant PHY76-81858.

SUPPORTED BY U.S. National Science Foundation, Div. of Physics

8.0018, SURVEILLANCE - HIGH-EFFICIENCY LASERS
M.A. Biondi, University of Pittsburgh, School of Arts & Sciences, Dept. of Physics & Astronomy, *,4200 5th Ave., Pittsburgh, Pennsylvania* 15260 (DN475353; N00014-76-C-0098)

The Navy requires improved high-efficiency lasers for surveillance, communications and weaponry. The objective of this work is to investigate atomic and molecular processess associated with new lasers for producing laser action in the visible or near visible spectrum at high efficiency and high power.

The systematics of V-V transfer are being investigated by studying this process in molecules with systematic variations of resonance energy, dipole moment, electronic states, and complexity. Recombination rates for Ar(2)ion and Ne(2)ion are being determined. Dissociating charge transfer collisions between Ne(2)ion, Ar(2)ion, and Xe(2)ion with Kr, Xe and Hg are being investigated. R-matrix theory is being used to study electron impact ionization of Ar and Ne metastables and to compute photoionization cross sections for metastable Ar and Ne. Finally, theoretical models are being formulated to describe three-body recombination.

SUPPORTED BY U.S. Dept. of Defense, Navy, Office of Naval Research

8.0019, ULTRAFINE-GRAINED SUPERCONDUCTORS
A.I. Braginski, Westinghouse Electric Corp., *3 Gateway Ctr., Pittsburgh, Pennsylvania* 15222 (DF038430; F49620-78-C-0031)

AF function - high-temperature superconducting materials are needed for application in airborne multimegawatt power generation and conditioning systems. Opportunity - research specifically directed toward the synthesis and characterization of high transition temperature metallic compounds can provide a greater margin of design efficiency and operational reliability than presently available superconductors. Objective - this research explores the feasibility of enhancing the superconducting and mechanical properties of high critical temperature superconductors through the preparation and characterization of materials with ultrafine-grained microstructures. How work contributes -the use of superconductors in airborne multimegawatt power generation and conditioning systems is desirable because of their ability to carry much larger current densities than conventional conductors and with lower losses. Hence very high magnetic fields can be generated with smaller, lighter windings. For many potential applications, the performance of high field magnets and solenoids, electric motor windings, superconducting rotors in power generators, transformers and induction energy storage systems could be significantly improved if the upper critical field, the current-carrying capacity and the critical transition temperature of the superconducting material could be enhanced.

The investigation will be conducted on Al5 and Bl high-Tc compounds by synthesizing and varying in a controlled way the ultrafine-grained microstructures. Initially the work will be done on thin films prepared by sputtering. Subsequently other synthesis techniques, such as fast quenching and low-temperature solution growth, will be investigated in a search for methods capable of producing the desired types of microstructure in bulk samples. Correlation of superconducting and mechanical properties with the characteristic microstructure parameters will be established experimentally and interpreted theoretically. Flux pinning characteristics will be determined and compared with existing phenomenological models to estimate limits of possible critical current density (JC) enhancement. Alternating current hysteresis losses will be measured and interpreted. The microstructure-related variation of critical transition temperature (Tc) and upper critical field (Hc2) will be studied. Finally, the strain sensitivity of superconducting properties will be determined.

SUPPORTED BY U.S. Dept. of Defense, Air Force, Office of Scientific Research

8.0020, APPLIED PLASMA PHYSICS--EXPERIMENTAL RESEARCH--EXPERIMENTAL ATOMIC, MOLECULAR AND NUCLEAR PHYSICS
C.F. Barnett, U.S. Dept. of Energy, Oak Ridge National Lab., *P.O. Box X, Oak Ridge Operations Office, Oak Ridge, Tennessee* 37830 (AF-01-03-30-0; W7405-ENG-26)

Atomic cross sections are vital to the understanding of high-temperature plasma experiments and to present and future machine designs. Our research program is aimed at producing cross-section data directly related to controlled thermonuclear research in the production, cooling, loss, and diagnostics of high-temperature plasmas.

BIBLIOGRAPHIC REFERENCES: R.A. Phaneuf, F.W. Meyer, R.H. McKnight, R.E. Olson, and A. Salop, Electron Capture and Impact-Ionization Cross Sections of N/sup q ion/ in Atomic Hydrogen, J. Phys. B 9, L1 (1977). R.A. Phaneuf, F.W. Meyer, and R.H. McKnight, Single Electron Capture by Multiply Charged Ions of Carbon, Nitrogen and Oxygen in Atomic and Molecular Hydrogen, Phys. Rev. A., February 1978.

SUPPORTED BY U.S. Dept. of Energy, Div. of Magnetic Fusion Energy

8.0021, SPECTROSCOPIC INVESTIGATION OF THE SPECIES EMITTING DIFFUSE LIGHT IN JOHNSON SPACE CENTER SOLAR PANEL PLASMA EFFECTS SIMULATION
D.G. Warren, Houston Baptist University, School of Science & Health Professions, Dept. of Chemistry, *7502 Fondren Rd., Houston, Texas* 77036 (NSG 9076)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

8.0022, AN INVESTIGATION OF CURRENT COLLECTION PROCESSES IN THE IONOSPHERE PLASMA AT HIGH POTENTIAL
P.R. Williamson, Utah Higher Education System, Utah State University, School of Engineering, Dept. of Electrical Engineering, *Office in Engineering, Room L50, Logan, Utah* 84321 (NSG 6027)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

8.0023, HIGH-TEMPERATURE PLASMAS
E. Hyman, Science Applications Inc., *8400 Westpark Dr., McLean, Virginia* 22101 (DN780194; N00173-77-C-0066)

To model a variety of high-temperature plasmas including the tokamak, relativistic electron and ion beams, exploding wire experiments, the reflex tride and tetrode, pinched beam diodes, and to calculate dielectronic recombination rates.

The development of computer models to simulate the various plasmas and comparison of model predictions with experimental measurements.

SUPPORTED BY U.S. Dept. of Defense, Navy, Naval Research Lab.

8.0024, GAMMA-RAY AND X-RAY SPECTROSCOPY OF SOLIDS UNDER PRESSURE
R.L. Ingalls, University of Washington, School of Arts & Sciences, Dept. of Physics, *Seattle, Washington* 98105 (DMR7824995)

This is a continuation of research previously supported under DMR 7621053.

The structure and behavior of materials at high pressure will be investigated by Mossbauer spectroscopy of magnetic materials containing iron-57 and X-ray absorption studies using synchrotron radiation. In the Mossbauer studies, the emphasis is on the pressure dependence of the hyperfine magnetic field and magnetic critical temperature as a function of pressure. In the X-ray absorption studies, the techniques are being refined for use in pressure calibration and pressure dependence of EXAFS (extended X-ray absorption fine structure) parameters in order to study electronic and structural transitions.

This is the first year of a three-year continuing grant.

SUPPORTED BY U.S. National Science Foundation, Div. of Materials Research

8.0025, COORDINATED SATELLITE ROCKET AND INCOHERENT SCATTER OBSERVATIONS
P. Lagos, Universidad Particular Peruana Cayetano Heredia, *Lima, Peru* (NSG 7524)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

SPACE SCIENCES

Includes Space Sciences (general); Astronomy; Astrophysics; Lunar and Planetary Exploration; Solar Physics; and Space Radiation. For Related Information See Also Geosciences.

10.0001, A MEASUREMENT OF THE COSMIC-RAY ENERGY SPECTRUM FROM 10 TO THE 11TH POWER TO 10 TO THE 16TH POWER EV
T.C. Weekes, Smithsonian Institution, Astrophysical Observatory, Mount Hopkins Observatory, *P.O. Box 97, Amado, Arizona* 85640 (SRF 460135)

The spectral exponent of the primary cosmic-ray energy spectrum between 10 to the 11th power and 10 to the 16th power eV will be measured with the atmospheric Cherenkov light technique. This important measurement will be undertaken at the Gamma-Ray Facility at the Smithsonian Institution's Mt. Hopkins Observatory in southern Arizona and will use the 10-m optical reflector and some smaller instruments. A preliminary experiment has shown that this is a feasible technique; With the cooperation of the cosmic-ray groups at the University of Arizona, Tucson, and the University of Durham, England, an experiment will be performed in the winter of 1975-76 that will provide the definitive measurement in this energy range. This proposal is for funds to ensure that the data taken are of the highest quality. The results could confirm the prediction that the lower energy cosmic radiation originates in nearby pulsars.

SUPPORTED BY Smithsonian Institution, Office of Fellowships and Grants

10.0002, RESEARCH IN THE CIRCULATION OF THE SOLAR ATMOSPHERE
H. Zirin, California Inst. of Technology, Graduate School, Dept. of Astrophysics, *1201 E. California Blvd., Pasadena, California* 91109 (ATM7621132A02)

This grant continues research in solar physics at Big Bear Observatory, California Institute of Technology. In the coming year the following observational programs will be emphasized: (1) Flare spectroscopy, particularly in H alpha and the higher Balmer lines. (2) Magnetic observations of flares. (3) Direct observations of flares. (4) Spectroscopic observations of oscillations and motions in sunspots. (5) Spectroscopy of solar prominences.

In the field of analysis the investigators will pursue their work on the thermal phase of the flare, including chromospheric evaporation and heating of the thermal X-ray plasma. They will continue to study changes in magnetic field configuration in a field-interruption flare and OSO-7 X-ray data.

The observatory will continue to provide the solar physics community with high-quality synoptic observations of solar phenomena.

The overall aim is to understand the violent, variable behavior of the sun as exhibited by sunspots, flares, etc.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

10.0003, WIDE-FIELD PLANETARY CAMERA FOR SPACE TELESCOPE
J. Westphal, California Inst. of Technology, Hale Observatory, *1201 E. California Blvd., Pasadena, California* 91109 (NAS 5-25451)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

10.0004, HIGH-ENERGY TELESCOPE DEFINITION STUDY
R. Hofstadter, Stanford University, Graduate School, Dept. of Physics, *Stanford, California* 94305 (NAS 5-25544)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

10.0005, STEREO PHOTOGRAMMETRIC AND STEREO PHOTOMETRIC ANALYSIS OF VIKING LANDER IMAGING DATA
Unknown, Stanford University, Graduate School, *Stanford, California* 94305 (NSG 7538)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

10.0006, REDUCTION AND ANALYSES OF VIKING BISTATIC - RADAR OBSERVATIONS OF MARS FROM THE WINTER 1977/1978 APPARITION
G.L. Tyler, Stanford University, School of Engineering, Dept. of Electrical Engineering, *Stanford, California* 94305 (NSG 7561)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

10.0007, STUDIES IN STELLAR EVOLUTION
P.R. Demarque, Yale University, Graduate School, Dept. of Astronomy, *206 Elm, New Haven, Connecticut* 06520 (AST7723188A01)

This research on stellar evolution will be concerned with theoretical problems of stellar interiors and the modelling of stellar populations in stellar systems. The emphasis of the work will be on three particular topics: 1) A program of construction of synthetic population models for stellar systems will be completed. 2) A study will be carried out of the effects on stellar evolution of variations in the carbon, nitrogen, and oxygen abundances. 3) There will be an investigation of the origin of the chemical inhomogeneities observed from star to star in old stellar systems, particularly within globular clusters. The emphasis will be on investigating effects of chemical mixing within the star.

This is a continuation of work previously supported under NSF Grant AST77 23188.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0008, DEEP-SPACE TELESCOPE EVALUATION AND DATA SETS
Unknown, University of Miami, Graduate School, *Miami, Florida* 33124 (NAS 5-25374)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

10.0009, THE COMPOSITION AND EVOLUTION OF PLANETARY NEBULAE
J.B. Kaler, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Astronomy, *Urbana, Illinois* 61801 (AST7823647)

The research to be carried out under this award will involve studies of the chemical compositions of planetary nebulae, the evolution of their central stars, and the relations that may exist between the two.

The evolution of planetary nebulae will be calculated. It should be possible to determine the evolution of these objectives on the basis of the mass of the star from which they orginate. Since it is believed that these stars eventually become white dwarf stars. A study will be made of the evolution of the central stars of planetary nebulae which appear to have characteristics similar to that of cooling white dwarf stars. In order to carry out such a study, it will be necessary to critically examine the methods used to dertermine the instances and temperature of these objects.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0010, A SEARCH FOR ERUPTIVE MASS TRANSFER IN ALGOL-LIKE ECLIPSING BINARY SYSTEMS
E.C. Olson, University of Illinois, Urbana Champaign Campus, School of Liberal Arts & Sciences, Dept. of Astronomy, *Urbana, Illinois* 61801 (AST7814469)

Studies of 'Algol-like' eclipsing binary star systems have produced a better understanding of close binaries. The key to Algol system evolution is mass transfer from the evolved star, which has filled its Roche lobe, to the other less evolved star. Much evidence suggests that the details of the transfer mechanism must be understood better before a clearer model of Algol evolution can be achieved. The fluctuating mass-transfer event observed in the binary U Cephei may be symptomatic of Algols in general. Such events offer a new means of estimating mass-transfer rates, of studying the dynamics of the process, the instability of the mass-losing star, and the response of the mass-receiving star. For the first time, in U Cephei there is an observed association between an eruptive transfer event and a sudden orbital period decrease. An intensive photometric search for such activity will be undertaken. It will accumulate a large body of standardized four-color and near-infrared photometry of six to a dozen systems that can also be used for future photometric solutions. It will further provide the basis for studying times of primary eclipses as a function of wavelength. Analysis of prior data on U Cephei will be continued.

Prior support was by NSF grant AST 76-24639.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0011, INVESTIGATION OF MICROSCOPIC AND MACROSCOPIC PLASMA PROPERTIES WITH APPLICATION TO SPACE PLASMAS
G.R. Joyce, University of Iowa, School of Liberal Arts, Dept. of Physics & Astronomy, *Jessup Hall, Iowa City, Iowa* 52240 (ATM7822487)

Because of the complicated interactions of charged particles, the equations that describe a plasma are necessarily complex and are difficult or impossible to solve exactly. This grant will support the application of numerical methods and analytical approximations to study the microscopic and macroscopic properties of space plasma systems. Specific areas to be studied include the following: the development and characteristics of potential double layers using two-dimensional numerical simulations; Langmuir turbulence and type III solar radio bursts; the formation of double layers in the magnetospheres of Earth and Jupiter and associated particle acceleration and radio emissions; and the structure of the outer Jovian magnetosphere including the distribution of cold plasma, the current sheet and the energetic particle acceleration.

SUPPORTED BY U.S. National Science Foundation, Div. of Atmospheric Sciences

10.0012, AN ATTEMPT TO DETECT X-RAY EMISSION
A.G. Willis, Brandeis University, School of Arts & Sciences, Dept. of Astrophysics, *415 South St., Waltham, Massachusetts* 02154 (NAS 8-33326)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

10.0013, MISSION DEFINITION AND SOFTWARE ANALYSIS STUDY FOR A VERY LONG BASE INTERFEROMETRY UTILIZING THE SPACE SHUTTLE
B.F. Burke, Massachusetts Inst. of Technology, School of Science, Dept. of Physics, *77 Massachusetts Ave., Cambridge, Massachusetts* 02139 (NAS 5-25543)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

10.0014, FLIGHT INFRARED ASTRONOMY
G. Fazio, Smithsonian Institution, Astrophysical Observatory, Solar & Stellar Physics Div, *60 Garden St., Cambridge, Massachusetts* 02138 (31S-4S50-05)

In cooperation with Harvard College Observatory and the University of Arizona, a 40-inch telescope was constructed, to be launched on a high-altitude balloon, to investigate the far-infrared spectrum of celestial sources. The successful flight was completed on 3 February 1974, from Palestine, Texas. The telescope, weighing 4000 pounds, was carried by a 5-million-cubic-ft balloon to an altitude of 90,000 feet, where it was commanded remotely from the ground to make infrared maps of NGC 7538, Mars, Orion A, and W3. Angular resolution of 1 arcmin was achieved, in the wavelength range 40-150 microns. Signals were very clear, and numerous small sources were seen in addition to those listed above. Instrument development continues and more flights are planned.

SUPPORTED BY Smithsonian Institution, Astrophysical Observatory

10.0015, THE STRUCTURE AND EVOLUTIONARY STATUS OF BE STARS

R.E. Schild, Smithsonian Institution, Astrophysical Observatory, Optical & Infrared Div, *60 Garden St., Cambridge, Massachusetts* 02138 (310-4050-11)

OBJECTIVE: Be stars are in a stage of evolution during which a disk of gas forms around the star, the disk manifesting itself in hydrogen emission lines. A quantitative study of the conditions in this envelope and in the atmosphere of the star provides information about the evolution of hot stars.

APPROACH: Observations of energy distributions and spectral line strengths have been made for several Be stars. These data will be combined with model computations of the envelope to derive quantitative values of the temperature, density and state of ionization.

PROGRESS: The energy distributions and line strengths have been measured. The model computations have been initiated, and the detailed comparison with the data will begin shortly.

FUTURE: Additional stars will be observed to extend the results found here.

SUPPORTED BY Smithsonian Institution, Astrophysical Observatory

10.0016, SPECTRA OF SUPERNOVAE

D.R. Branch, University of Oklahoma, Norman Campus, School of Arts & Sciences, Dept. of Astronomy, *660 Parrington Oval, Room 101, Norman, Oklahoma* 73069 (AST7808672)

Within the last decade there have been interpretations of the light emitted by supernovae. Physical conditions and chemical compositions in supernovae envelopes can now be investigated, and models of the envelopes can be used to derive distances to supernovae. These derived distances are independent of all other astronomical distance calibrations.

The proposed research will be a detailed investigation of supernovae spectra. Synthetic spectra will be computed and compared with observed spectra of supernovae. The objectives will be to test the interpretations that have been made of how this light is produced, to establish identifications of spectral features, to investigate physical conditions and chemical compositions in supernovae envelopes, and to improve the supernovae method for estimating the extragalactic distance scale.

SUPPORTED BY U.S. National Science Foundation, Div. of Astronomical Sciences

10.0017, X-RAY OBSERVATIONS OF M51 AND M58 - THE DYNAMICS OF SPIRAL GALAXIES

C.L. Sarazin, University of Virginia, School of Arts & Sciences, Dept. of Astronomy, *Garrett Hall, Charlottesville, Virginia* 22903 (NAS 8-33348)

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

GENERAL

11.0001, LILIENTHAL AND THE AMERICANS

T.D. Crouch, Smithsonian Institution, Dept. of Astronautics, *1000 Jefferson Dr. S.W., Washington, District of Columbia* 20560

Project will result in a scholarly essay on the impact of Otto Lilienthal on American aeronautics. The essay will be used as a foreword to the published English translation of Gustav Halle's biography of Lilienthal. Translation of total work is now underway. MIT Press is interested in publishing finished volume.

SUPPORTED BY Smithsonian Institution, National Air & Space Museum

11.0002, THE NATIONAL AIRCRAFT COLLECTION

C.M. Oakes, Smithsonian Institution, National Air & Space Museum, *1000 Jefferson Dr. S.W., Washington, District of Columbia* 20560

Documenting the aircraft collection of the U.S. National Aircraft Collection. Documenting includes graphic as well as the technical and historical aspects of the specimens in this, the largest collection of its kind in the world.

A catalog documenting some 20 to 25% of the Collection is being prepared.

A catalog documenting the 65 aircraft displayed in the NASM at its opening was published in 1976. Work continues on expanding the catalog to cover the remainder of the collection.

SUPPORTED BY Smithsonian Institution, National Air & Space Museum

11.0003, TECHNICAL SERVICES OPERATIONS & MATERIALS FOR GODDARD INSTITUTE FOR SPACE STUDIES (ABBREV)

J. Yavarkovsky, Columbia University, Graduate School, *109 Low Memorial Library, New York, New York* 10027 (NAS 5-25422)

Technical services operations and materials for the acquisition, processing and cataloging of books, periodicals and other literature for Goddard Institute for Space Studies.

SUPPORTED BY U.S. National Aeronautics & Space Admin., Office of Org. & Management, Office of University Affairs

VOLUME 17 NUMBER 17 / SEPTEMBER 8, 1979

Scientific and Technical Aerospace Reports

A Semimonthly Publication of the National Aeronautics and Space Administration

01 AERONAUTICS (GENERAL)

N79-26009*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FUEL-CONSERVATIVE GUIDANCE SYSTEM FOR POWERED-LIFT AIRCRAFT
Heinz Erzberger and John D. McLean Jun. 1979 18 p refs To be presented at the AIAA Guidance and Control Conf., Boulder, Colo., 6-7 Aug. 1979
(NASA-TM-78595; A-7860) Avail: NTIS HC A02/MF A01 CSCL 01C

A concept for automatic terminal area guidance, comprising two modes of operation, was developed and evaluated in flight tests. In the predictive mode, fuel efficient approach trajectories are synthesized in fast time. In the tracking mode, the synthesized trajectories are reconstructed and tracked automatically. An energy rate performance model derived from the lift, drag, and propulsion system characteristics of the aircraft is used in the synthesis algorithm. The method optimizes the trajectory for the initial aircraft position and wind and temperature profiles encountered during each landing approach. The design theory and the results of simulations and flight tests using the Augmentor Wing Jet STOL Research Aircraft are described. S.E.S.

N79-26010# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
A CONSIDERATION OF GENERAL AVIATION IN THE UK
R. E. Caves May 1979 73 p refs
(TT-7902; ISSN-0140-9751) Avail: NTIS HC A04/MF A01

Performance and cost data for the operation of a range of general aviation aircraft in the U.K. were established. Two potentially attractive routes were examined from a conventional, theoretical stand point to demonstrate the marginal nature of Third Level operations. Some attention is given to airport access, to non-scheduled general aviation, and to the relevance of the results within present U.K. transport planning choices. J.A.M.

02 AERODYNAMICS

Includes aerodynamics of bodies, combinations, wings, rotors, and control surfaces; and internal flow in ducts and turbomachinery.

For related information see also *34 Fluid Mechanics and Heat Transfer.*

N79-26011 Minnesota Univ., Minneapolis.
HEAT/MASS TRANSFER CHARACTERISTICS AND FLUID FLOW PATTERNS FOR AIRFLOW ABOUT AN INCLINED AND YAWED FLAT PLATE Ph.D. Thesis
Ke-Kung Tien 1978 99 p
Avail: Univ. Microfilms Order No. 7912095

Wind tunnel experiments were performed to determine the local and average heat transfer coefficients and the patterns of fluid flow for a square plate situated at various orientations to the flow direction. Mass transfer experiments via naphthalene sublimation technique were employed for the transfer coefficient determination, using air as the working fluid. It was found that the average transfer coefficients were remarkably insensitive to changes in orientation. The local heat (or mass) transfer coefficients are presented as contour diagrams in which lines depicting constant values of the coefficient are plotted. The fluid flow patterns are presented via photographs. The flow was found to be highly complex and three dimensional. Dissert. Abstr.

N79-26012# Avco-Everett Research Lab., Mass.
PULSED-LASER-GENERATED IMPULSE ON A SURFACE IN SUPERSONIC FLOW
J. A. Woodroffe, J. O. A. Stankevics, A. Ballantyne, and J. P. Reilly 31 May 1979 30 p refs Backup document for AIAA Synoptic scheduled for publication in AIAA Journal in Dec. 1979
(Log-J-10741) Avail: NTIS HC A03/MF A01

Pulsed-laser impulses in a supersonic flow field were measured in the flux range 10 to the 6th power to 10 to the 7th power w/sq cm. The essential features of the phenomenology were correlated by a parametric model of momentum transfer by a pulsed laser in a supersonic flow. A comparison between theory and measurement is given. The analytical model indicates that large values of impulse enhancement will occur in flight conditions. A.R.H.

N79-26013*# Maryland Univ., College Park. Dept. of Aerospace Engineering.
A STUDY OF THE DROOPED LEADING EDGE AIRFOIL
John D. Anderson, Jr. and Jewel B. Barlow Apr. 1979 41 p refs
(Grant NsG-1570)
(NASA-CR-158717; SR-1) Avail: NTIS HC A03/MF A01 CSCL 01A

Wind tunnel tests were conducted to examine various aspects of the drooped-leading edge airfoil which reduces the tendency for an airplane to enter a spin after stall occurs. Three baseline models were used for tests of two dimensional models: NACA 0015, 0014.6, and 0014.2. The 14.6% and 14.2% models were derived from NACA 0015 sections by increasing the chord and matching the profiles aft section. Force, balance data (lift, drag, pitching moment) were obtained for each model at a free-steam Reynold's number of 2.66 x 10 to the 6th power/m. In addition, oil flow visualization tests were performed at various angles of attack. An existing NACA 64 sub 1 A211 airfoil was used in a second series of tests. The leading edge flap was segmented in three parts which allowed various baseline/drooped leading edge configurations to be tested. Force balance and flow visualization tests were completer at chord Renolds numbers of 0.44 x 10 to the 6th power, 1.4 x 10 to the 6th power, and 2.11 x 10 to the 6th power. Test results are included. A.R.H.

N79-26014*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
CONTROL OF FOREBODY THREE-DIMENSIONAL FLOW SEPARATIONS

David J. Peake and F. Kevin Owen (Owen Intern., Inc., Palo Alto, Calif.) May 1979 52 p refs Presented at the AGARD Fluid Dyn. Panel Symp. on Aerodyn. Characteristics of Controls, Naples, May 1979 Sponsored in part by AFAL
(Contract NAS2-9663)
(NASA-TM-78593; A-7841) Avail: NTIS HC A04/MF A01 CSCL 01A

Some experiments involving the development of the turbulent symmetric vortex flow about the lee side of a 5 deg semiangle conical forebody at high relative incidence are discussed. The cone was immersed in a Mach 0.6 airstream at a Reynolds number of 13.5 million based on the 1.4 - m axial length of the cone. Novel means of controlling the degree of asymmetry using blowing very close to the nose were investigated. Small amounts of air injected normally or tangentially to the cone surface, but on one side of the leeward meridian and beneath the vortex farthest from the wall, were effective in biasing the asymmetry. With this reorientation of the forebody vortices, the amplitude of the side force could be reduced to the point where its direction was reversed. This phenomenon could be obtained either by changing the blowing rate at constant incidence or by changing incidence at constant blowing rate. Normal injection was more effective than tangential injection. An organized and stable flow structure emerged with the jet vortices positioned above the forebody vortices. M.M.M.

N79-26015*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FUSELAGE SURFACE PRESSURE MEASUREMENTS OF A HELICOPTER WIND-TUNNEL MODEL WITH A 3.15-METER DIAMETER SINGLE ROTOR
Carl E. Freeman and Raymond E. Mineck Mar. 1979 170 p refs
(NASA-TM-80051) Avail: NTIS HC A08/MF A01 CSCL 01A

A wind-tunnel investigation was conducted to measure the time averaged fuselage surface pressures of a helicopter model with a 3.15 meter diameter, four-bladed articulated rotor. Measurements were made at hover and advance ratios of 0.05, 0.15, and 0.20 for a range of thrusts. Data are presented with no analysis. Author

N79-26016*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.
GROUND-BASED MEASUREMENTS OF THE WAKE VORTEX CHARACTERISTICS OF A B-747 AIRCRAFT IN VARIOUS CONFIGURATIONS Final Report, Dec. 1975 - Jul. 1978
D. C. Burnham (Transportation Systems Center), J. N. Hallock (Transportation Systems Center), I. H. Tombach (AeroVironment, Inc.), M. R. Brashears (Lockheed Missiles and Space Co., Huntsville, Ala.), and M. R. Barber Dec. 1978 545 p refs (NASA-TM-80474; AD-A067588; FAA-RD-78-146; DOT-TSC-FAA-78-28) Avail: NTIS HC A23/MF A01 CSCL 01/2

A Boeing 747 aircraft flew 54 passes at low altitude over ground based sensors. Vortex velocities were measured by a laser Doppler velocimeter, an array of monostatic acoustic sounders, and an array of propeller anemometers. Flow visualization of the wake was achieved using smoke and balloon tracers and was recorded photographically. Data were obtained on vortex velocity fields, vortex decay, and the effects of spoilers and differential flap settings on the dissipation and structure of the vortices. Author

N79-26017*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
WIND-TUNNEL INVESTIGATION OF HIGHLY MANEUVERABLE SUPERSONIC V/STOL FIGHTER
Michael Falarski Jun. 1979 24 p refs Presented at V/STOL Aerodyn. Workshop, Monterey, Calif., May 1979
(NASA-TM-78599; A-7876) Avail: NTIS HC A02/MF A01 CSCL 01A

Results from the initial wind-tunnel test of a large-scale, highly maneuverable supersonic V/STOL fighter model in the Ames 40- by 80-foot wind tunnel are summarized. The STOL configuration which was tested combined upper surface blowing and spanwise blowing to improve the lift characteristics over a wide angle-of-attack range. A close-coupled canard was added to this configuration to create a highly maneuverable STOL aircraft. The 7.28 m (24 ft) span model was powered by two J-97 turbojet engines, each producing 9340 N (2200 lb) thrust at a pressure ratio of 2. With the nozzle flap and aileron set at 30 deg, the model produced lift coefficients greater than 4. The model was longitudinally unstable because of the forward canard position and because of the large body area of fuselage, strake, and nacelles forward of the center of gravity. J.A.M.

N79-26018*# Kansas Univ. Center for Research, Inc., Lawrence.
COMPARISON OF THEORETICAL PREDICTED LONGITUDINAL AERODYNAMIC CHARACTERISTICS WITH FULL-SCALE WIND TUNNEL DATA ON THE ATLIT AIRPLANE
Cornelis P. G. vanDam, Michael Griswold, and J. Roskam Jul. 1979 365 p
(Grant NsG-1574)
(NASA-CR-158753; KU-FRL-399-1) Avail: NTIS HC A16/MF A01 CSCL 01A

An analytical method is presented for predicting the lift coefficient, the pitching moment coefficient, and the drag coefficient of light, twin-engine, propeller-driven airplanes. The method was applied to the Advanced Technology Light Twin-Engine airplane. The calculated characteristics were then correlated against full scale wind tunnel data. The analytical method was found to predict the drag and pitching moment fairly well. However, the lift prediction was extremely poor. R.E.S.

N79-26019*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMPUTER PROGRAMS FOR CALCULATING TWO-DIMENSIONAL POTENTIAL FLOW THROUGH DEFLECTED NOZZLES
J. Dennis Hawk and Norbert O. Stockman May 1979 316 p refs
(NASA-TM-79144; E-9999) Avail: NTIS HC A14/MF A01 CSCL 01A

Computer programs to calculate the incompressible potential flow, corrected for compressibility, in two-dimensional nozzles at arbitrary operating conditions are presented. A statement of the problem to be solved, a description of each of the computer programs, and sufficient documentation, including a test case, to enable a user to run the program are included. J.M.S.

N79-26020*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF WING LEADING-EDGE DEFLECTION ON LOW-SPEED AERODYNAMIC CHARACTERISTICS OF A LOW-ASPECT-RATIO HIGHLY SWEPT ARROW-WING CONFIGURATION
Paul L. Coe, Jr. and Robert P. Weston 1979 73 p refs
(NASA-TP-1434; L-12784) Avail: NTIS HC A04/MF A01 CSCL 01A

Static force tests were conducted in the Langley V/STOL tunnel at a Reynolds number (based on the mean aerodynamic chord) of about 2.0 x 10 to the 6th power for an angle-of-attack range from about - 10 deg to 17 deg and angles of sideslip of 0 and + or - 5 deg. Limited flow visualization studies were also conducted in order to provide a qualitative assessment of leading-edge upwash characteristics. A.R.H.

N79-26021*# Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.
BUMBLEBEE PROGRAM AERODYNAMIC DATA. PART 3: PRESSURE FIELDS AT MACH NUMBERS 1.5 TO 2.0
G. A. Barnes and L. L. Cronvich Apr. 1979 169 p
(NASA Order L-600036-A)
(NASA-CR-3116) Avail: NTIS HC A08/MF A01 CSCL 01A

Additional data are provided for use in defining the Mach number effect (M = 1.5 and 2.0) on flow field characteristics around a missile body at relatively high angles of attack (to alpha = 23 deg). The Mach number effect is described by means of pressure fields only, at a mid-body station where a wing might be located. A.R.H.

N79-26022*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF SEVERAL GEOMETRIC PARAMETERS ON THE

STATIC INTERNAL PERFORMANCE OF THREE NONAXISYMMETRIC NOZZLE CONCEPTS

Bobby L. Berrier and Richard J. Re Jul. 1979 136 p refs
(NASA-TP-1468; L-12810) Avail: NTIS HC A07/MF A01 CSCL 01A

Effects of several geometric parameters on the internal performance of nonaxisymmetric convergent-divergent, single-ramp expansion, and wedge nozzles were investigated at nozzle pressure ratios up to approximately 10. In addition, two different thrust-vectoring schemes were investigated with the wedge nozzle. The results indicated that as with conventional round nozzles, peak nonaxisymmetric nozzle, internal performance occurred near the nozzle pressure ratio required for fully expanded exhaust flow. Nozzle sidewall length or area generally had little effect on the internal performance of the nozzles investigated. J.A.M.

N79-26023*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

EFFECT OF NOSE BLUNTNESS AND AFTERBODY SHAPE ON AERODYNAMIC CHARACTERISTICS OF A MONOPLANAR MISSILE CONCEPT WITH BODIES OF CIRCULAR AND ELLIPTICAL CROSS SECTIONS AT A MACH NUMBER OF 2.50

Ernald B. Graves and Roger H. Fournier Washington 1979 88 p refs
(NASA-TM-80055; L-12632) Avail: NTIS HC A05/MF A01 CSCL 01A

The tests were performed at a Mach number of 2.50 and at angles of attack from about -4 deg to 32 deg. The results indicate that increasing nose bluntness increases zero lift drag and decreases both the maximum lift-drag ratio and the level of directional stability. The center of pressure generally moves forward with increasing nose size; however, small nose radii on the modified elliptical configurations move the center of pressure rearward. The circular bodied configurations exhibit the greatest longitudinal stability and the least directional stability. Concepts with the variable geometry afterbody contour display the most directional stability and the greatest zero lift drag. S.E.S.

N79-26024*# Low Energy Transport Systems, Capistrano Beach, Calif.

SUMMARY OF PAST EXPERIENCE IN NATURAL LAMINAR FLOW AND EXPERIMENTAL PROGRAM FOR RESILIENT LEADING EDGE

B. H. Carmichael May 1979 50 p refs
(Contract NAS2-10113)
(NASA-CR-152276) Avail: NTIS HC A03/MF A01 CSCL 01A

The potential of natural laminar flow for significant drag reduction and improved efficiency for aircraft is assessed. Past experience with natural laminar flow as reported in published and unpublished data and personal observations of various researchers is summarized. Aspects discussed include surface contour, waviness, and smoothness requirements; noise and vibration effects on boundary layer transition, boundary layer stability criteria; flight experience with natural laminar flow and suction stabilized boundary layers; and propeller slipstream, rain, frost, ice and insect contamination effects on boundary layer transition. The resilient leading edge appears to be a very promising method to prevent leading edge insect contamination. A.R.H.

N79-26025# Naval Ship Research and Development Center, Bethesda, Md. Aviation and Surface Effects Dept.

AERODYNAMIC CHARACTERISTICS OF THE CLOSE-COUPLED CANARD AS APPLIED TO LOW-TO-MODERATE SWEPT WINGS. VOLUME 2: SUBSONIC SPEED REGIME Final Report, 1970 - 1974

David W. Lacey Jan. 1979 116 p refs
(WF14142109)
(AD-A067122; AERO-1257-Vol-2; DTNSRDC-79/002) Avail: NTIS HC A06/MF A01 CSCL 01/3

An analysis of the effects of canard size, shape, position and deflection on the aerodynamic characteristics of two general research models having leading edge sweep angles of 25 and 50 degrees is presented. The analysis summarizes the findings of four experimental subsonic wind-tunnel programs conducted at the David W. Taylor Naval Ship Research and Development Center between 1970 and 1974. The analysis is based on four canard geometries varying in planform from a 60-degree delta to a 25-degree swept wing high aspect ratio canard. The canards were located at seven different positions and deflected from -10 to 25 degrees. Significant findings include: the excellent correlation between canard exposed area ratio and changes in lift, drag, and pitching moment; the detrimental effect of positive canard deflection; and the optimum longitudinal position for each canard shape for maximum improvements in lift and drag. It is further concluded that the favorable aerodynamic changes caused by interference of the close-coupled canard are not significantly dependent on wing leading edge sweep or wing leading edge modifications. Author (GRA)

N79-26026# Oklahoma Univ., Norman. School of Aerospace, Mechanical and Nuclear Engineering.

LIFTING BODIES DERIVED FROM SUPERSONIC FLOWS PAST INCLINED CIRCULAR AND ELLIPTIC CONES Final Report

Maurice L. Rasmussen Dec. 1978 86 p refs
(Grant AF-AFOSR-3468-77)
(AD-A068003; OU-AMNE-78-11; AFOSR-79-0474TR) Avail: NTIS HC A05/MF A01 CSCL 20/4

Lifting-body configurations are constructed from stream surfaces generated by means of supersonic flows past inclined circular and elliptic cones. By such means waverider shapes are devised with curved surfaces and known pressure fields and shock-layer structures. The conical flow fields stem from perturbations of the basic axisymmetric cone flow arising from small angle of attack and small cross-section eccentricity. The approximate results are analytic and in the form of hypersonic small disturbance theory. Various possibilities for waverider shapes are discussed. Design formulas are presented that determine how the Mach number, angle of attack, cross-section eccentricity, and characteristic cone angle affect the waverider shape, pressure distribution, and shock-layer structure. Author (GRA)

N79-26027# Oklahoma Univ., Norman. School of Aerospace, Mechanical and Nuclear Engineering.

SUPERSONIC FLOW PAST CONICAL BODIES WITH NEARLY CIRCULAR CROSS SECTIONS Final Report

Martin C. Jischke Oct. 1978 65 p refs
(Grant AF-AFOSR-3468-77)
(AD-A068004; OU-AMNE-78-10; AFOSR-79-0475TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

Inviscid, supersonic conical flows past bodies whose cross-section deviates slightly from that of a right circular cone are studied by means of a perturbation technique. The effects of small angles of attack and yaw are included. Using the hypersonic small disturbances theory approximations, we have developed explicity results for the flow field velocity components, pressure, entropy, and shock shape for cases n, m = 1, 2, 3, 4. Comparisons of theory with experiment for n = 1, 2 are favorable. The stream surfaces of the velocity field are calculated and possible waverider geometries that can be developed therefrom are discussed. GRA

N79-26028# Oklahoma Univ., Norman. School of Aerospace, Mechanical and Nuclear Engineering.

HYPERSONIC FLOW PAST A SLENDER ELLIPTIC CONE Final Scientific Report

Hsiung Ming Lee and Maurice L. Rasmussen Nov. 1978 71 p refs
(Grant AF-AFOSR-3468-77; AF Proj. 2301)
(AD-A068002; OU-AMNE-78-2; AFOSR-79-0473TR) Avail: NTIS HC A04/MF A01 CSCL 20/4

An approximate analytical solution is obtained for hypersonic flow past a slender elliptic cone at small angle of attack. The analysis is based on perturbations of hypersonic flow past a circular cone aligned with the free stream, the perturbations stemming from the linear combination of small angle of attack and small cross-section eccentricity. By means of previously obtained hypersonic approximations for the basic-cone problem, closed-form approximate solutions for the perturbation equations are obtained within the framework of hypersonic small disturbance theory. Results for the shock shape, shock-layer structure, and surface conditions are presented, together with comparisons with experimental data. Author (GRA)

N79-26029# Louisiana State Univ., Baton Rouge. Dept. of Mechanical Engineering.
DEVELOPMENT OF A RESEARCH PLAN FOR THE IMPROVEMENT OF AERODYNAMIC MODELS FOR ANALYSIS OF BALLISTIC RANGE DATA Final Report, 1 Feb. 1978 - 31 Jan. 1979
Robert W. Courter Mar. 1979 51 p refs
(Grant AF-AFOSR-3489-78; AF Proj. 2307)
(AD-A067950; AFOSR-79-0476TR) Avail: NTIS HC A04/MF A01 CSCL 16/2

A study is made of the relationship between aerodynamic models and parameter estimation methods to determine a feasible plan for improving the aerodynamic models which are used for ballistic range data analysis at Eglin AFB. A plan is presented which utilizes a computer graphics terminal to process simulation runs and provide comparisons with experimental data and theoretical data fits. Included in the report are algorithms for performing system simulation and for accounting for mass-offset effects on the motion of the test item. Author (GRA)

N79-26030# Analytical Methods, Inc., Bellevue, Wash.
A VISCOUS/POTENTIAL FLOW INTERACTION ANALYSIS FOR CIRCULATION-CONTROLLED AIRFOILS Final Report
F. A. Dvorak May 1978 52 p refs
(Contract N00600-76-C-1494)
(AD-A067913; Rept-7710) Avail: NTIS HC A04/MF A01 CSCL 20/4

A method developed for the analysis of the incompressible viscous flow over circulation-controlled airfoils is described. A surface vorticity method is used to solve the inviscid portion of the flow and a combination of integral and finite difference methods is used to calculate the development of the viscous layers. An iterative process is used to arrive at final solutions which satisfy an appropriate trailing-edge condition and incorporate the interaction between the viscous and potential regions of the flow. Comparisons between calculated and experimental results show good agreement for surface pressure distributions and lift coefficients over a range of blowing momentum coefficient from 0 to 0.12. A discussion of the possibility of Coanda jet detachment when circulation-controlled airfoils are operating at high subsonic Mach Numbers is included in an Appendix.
Author (GRA)

N79-26031# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
OPTIMUM TAIL FAIRINGS FOR BODIES OF REVOLUTION Final Report
A. M. O. Smith, T. R. Stokes, Jr., and R. S. Lee Mar. 1979 54 p refs
(Contract N00014-77-C-0672)
(AD-A067927; MDC-G7823) Avail: NTIS HC A04/MF A01 CSCL 20/4

This report describes a computerized method that will design tails for bodies of revolution that satisfy the Stratford criterion for zero wall shear. Stratford's original two-dimensional solution is extended to axisymmetric flow in order to implement the procedure. The method involves simultaneous solution of the extended Stratford equation and the necessary boundary conditions through the use of an inverse potential flow program. Tails designed with this procedure can be categorized as follows: (1) The entire tail is at incipient separation (no skin friction); (2) The pressure recovery is the most rapid possible; (3) The resultant tail is the shortest possible. The final result is a unique geometry for given freestream conditions and boundary layer transition point. By unique, it is meant that any deviation from the 'ideal' geometry will either cause extensive separation or the tail must become longer and, hence, contribute to skin friction and reduced volumetric efficiency. GRA

N79-26032# Imperial Coll. of Science and Technology, London (England). Dept. of Aeronautics.
RESEARCH PROGRAMME ON TURBULENT SHEAR LAYERS
P. Bradshaw Jun. 1978 14 p refs
(IC-AERO-78-105) Avail: NTIS HC A02/MF A01

Experiments on complex turbulent flows (shear layers perturbed by externally-imposed extra strain rates or by interactions with another turbulent field) were performed to improve engineering calculation methods. Work on turbulence modeling, numerical problems of complex-flow calculation, transition, and wind-tunnel aerodynamics is described. Details of past and future projects, and of experimental techniques and equipment developed within the group are included.
Author (ESA)

N79-26033# National Technical Information Service, Springfield, Va.
PARACHUTES AND DECELERATORS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1974 - Mar. 1979
Guy E. Habercom, Jr. May 1979 315 p Supersedes NTIS/PS-78/0320; NTIS/PS-77/0317; NTIS/PS-76/0259; NTIS/PS-75/224
(NTIS/PS-79/0368/5; NTIS/PS-78/0320; NTIS/PS-77/0317; NTIS/PS-76/0259; NTIS/PS-75/224) Avail: NTIS HC A14/MF A01 CSCL 01C

Citations describe devices such as towplates, ballutes, servoactuators, patented mechanisms, semiautomatic openers, and release systems. Discussions are made of inflatable, supersonic, autorotor, retrorocket, and other structures. Descent characteristics, trajectories, aerodynamic reefing, shroud line and snatch forces, and flare engineering are included. Also presented are materials on flight testing, models, wind tunnel tests, and computer aided design. Applications are to target drone retrieval, air drop and delivery, coastal upwelling, sewage water tracking, and mine ventilation. (This updated bibliography contains 308 abstracts, 27 of which are new entries to the previous edition.) GRA

03 AIR TRANSPORTATION AND SAFETY

Includes passenger and cargo air transport operations; and aircraft accidents.

For related information see also *16 Space Transportation* and *85 Urban Technology and Transportation*.

N79-26034# National Transportation Safety Board, Washington, D. C.
AIRCRAFT ACCIDENT REPORT: LAS VEGAS AIRLINES, PIPER PA-31-350, N44LV, LAS VEGAS, NEVADA, AUGUST 30, 1978
7 Jun. 1979 38 p
(NTSB-AAR-79-8) Avail: NTIS HC A03/MF A01

About 0747 P.d.t., on August 30 1978, Las Vegas Airlines Flight 44, a Piper PA-31-350 (N44LV), crashed in VFR conditions shortly after takeoff from runway 25 at the North Las Vegas Airport, Las Vegas, Nevada. Flight 44 was a charter flight from Las Vegas, Nevada, to Santa Ana, California, with nine passengers and a pilot on board. After liftoff following a longer-than-normal ground roll, the aircraft pitched nose up, climbed steeply to about 400 ft above the ground, stalled, reversed course, and crashed 1,150 ft beyond and 650 ft to the right of the runway. There was no fire. All persons on board the aircraft were killed. The National Transportation Safety Board determines that the probable cause of the accident was the backed out elevator down-stop bolt tha5 limited down elevator travel and made it impossible for the pilot to prevent a pitchup and stall after takeoff. Author

N79-26035*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
QUIET PROPULSIVE LIFT FOR COMMUTER AIRLINES
Darrell E. Wilcox and John A. Cochrane Jun. 1979 29 p refs
(NASA-TM-78596; A-7861) Avail: NTIS HC A03/MF A01 CSCL 01C

The performance of STOL or RTOL aircraft and NASA's research program to provide options for future design and certification of quiet propulsive-life transports is described.
M.M.M.

N79-26036# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.

FEASIBILITY OF NON-CATAPULT EJECTION AND HAZARD OF AN EJECTION SEAT ROCKET PLUME
Thomas J. Zenobi 23 Jan. 1979 21 p refs
(AD-A067080; NADC-78225-60) Avail: NTIS HC A02/MF A01 CSCL 01/3

Efforts conducted by the Navy focused on feasibility of utilizing a rocket propelled ejection seat without a catapult. It was speculated that elimination of the catapult would result in significant weight reduction. However, between time of rocket ignition and the time the ejecting crewmember leaves the cockpit, there is a burn hazard to the crewmember created by the rocket exhaust plume from his own rocket as it scatters about the cockpit. The crewman may be exposed to temperatures as high as 5000 F during ejection. Extreme temperature and blast pressure also create severe erosive effects. Methods for protecting the crewmember from the rocket plume which were investigated included venting the plume, containing/shielding the plume, and quenching afterburn of rocket propellant with inert gas. Engineering trade-offs such as weight penalties, complexity of maintenance, cost and anomalies on overall escape system performance were compared between utilization of the catapult and rocket plume protection methods. Based on these engineering trade-offs it was concluded that the catapult is still recommended for use in current aircraft cockpits. Author (GRA)

N79-26037# Calspan Corp., Buffalo, N. Y.
AN OPERATIONAL RESEARCH INVESTIGATION OF THE ICE-DETECTION CAPABILITY AND UTILITY OF THE SURFACE CONDITION ANALYZER (SCAN) SYSTEM AND ITS APPLICABILITY TO NAVY-WIDE USE Final Report, 8 Feb. 1978 - 7 Apr. 1979
E. J. Mack, R. J. Anderson, D. H. Bock, T. A. Niziol, and H. G. Reif Mar. 1979 181 p refs
(Contract N00014-78-C-0284)
(AD-A067174; CALSPAN-6283-M-1) Avail: NTIS HC A09/MF A01 CSCL 01/2

During 1978, Calspan Corporation conducted an independent research investigation of the basic principles and operational performance of the Surface Condition Analyzer system (SCAN)TM in the detection of icing conditions on runway surfaces and its applicability to Navy-wide use. The results and conclusions derived from this investigation were formulated from data and information garnered from the following sources: site visits and interviews at civil and Naval airfields where SCAN is installed; visits and discussions at the manufacturer's plant; strip-chart records of actual SCAN-output signals, correlated with visual inspection of runway and sensor surfaces, runway traction, and display terminal readouts, obtained during a two-week operational performance study at Keflavik NAS; study of the manufacturer's drawings and schematics; review of the literature on snow and ice removal and control (SIRC) operations and economic analyses of these procedures as impacted by SCAN; and climatological analyses. The principal conclusion was that, while SCAN will not supplant routine personal inspection of runways, SCAN's ability to provide, on occasion, advance warning of hazardous icing conditions coupled with its surface temperature information (used for more effective chemical application) makes it well worth the investment costs. Author (GRA)

N79-26038# Naval Air Development Center, Warminster, Pa. Aircraft and Crew Systems Technology Directorate.
DEVELOPMENT OF AN INFLATABLE HEAD/NECK RESTRAINT SYSTEM FOR EJECTION SEATS, UPDATE
Thomas J. Zenobi 19 Dec. 1978 36 p refs
(AD-A067124; NADC-78213-60) Avail: NTIS HC A03/MF A01 CSCL 06/17

A ring-shaped inflatable head/neck restraint system for ejection seats is being developed at the Aircraft and Crew Systems Technology Directorate, NADC. The purpose of this system is to reduce neck injuries due to violent forward head rotation at the time of ejection thrust on parachute opening shock. Inflation of the neck ring will be conducted by a solid propellant gas generator. Design considerations include form-an-fit, cost effectiveness, packaging and integration into life support equipment.
Author (GRA)

N79-26039# Air Force Engineering Technology Office, Tyndall AFB, Fla.
AN EVALUATION OF THE BIRD/AIRCRAFT STRIKE HAZARD DYESS AIR FORCE BASE, TEXAS
James S. Kent and Ardrah L. Buddin, III Sep. 1978 53 p refs
(AD-A068026; AFETO-TM-8-78) Avail: NTIS HC A04/MF A01 CSCL 01/2

The Air Force Engineering Technology Office's Bird/Aircraft Strike Hazard (BASH) Team surveyed Dyess AFB from 20 to 30 September 1978. During this period environmental factors which create potential bird strike hazards were observed. Specific recommendations based on observations are provided to reduce the bird strike hazard. Author (GRA)

N79-26040# Royal Aircraft Establishment, Farnborough (England). Dept. of Engineering Physics.
A STUDY OF SMOKE MOVEMENT IN AN AIRCRAFT FUSELAGE
T. J. Methven and J. S. Webster 11 Jan. 1978 31 p refs
(RAE-TM-EP-613; BR61816) Avail: NTIS HC A03/MF A01

The migration of smoke from in-flight fires and possible measures to improve its removal were studied in ground tests on a Comet 4B. Results show that under normal conditions, smoke generated in various sections in the fuselage follows the air flow and disperses throughout the fuselage before passing overboard. Biasing discharge to the front or rear affects smoke clearance only slightly, but directing the total air supply to the compartment in which the smoke is generated has a beneficial effect locally at the expense of adjacent cabins. Tests in the flight deck show that, in smoke laden conditions, flight instruments were best viewed with individual illumination in low ambient light. Further work with higher smoke densities is recommended. Author (ESA)

04 AIRCRAFT COMMUNICATIONS AND NAVIGATION

Includes digital and voice communication with aircraft; air navigation systems (satellite and ground based); and air traffic control.

For related information see also *17 Spacecraft Communications, Command, and Tracking* and *32 Communications*.

N79-26041# Lincoln Lab., Mass. Inst. of Tech., Lexington.
UPLINK ATCRBS ENVIRONMENT MEASUREMENTS ALONG THE BOSTON-WASHINGTON CORRIDOR. VOLUME 2: INTERROGATOR CHARACTERISTICS
Ferenc Nagy, Jr. 28 Feb. 1979 88 p refs
(Contracts DOT-FA71WAI-242; F19628-78-C-0002; FAA Proj. 052-241-04)
(AD-A067944; ATC-83-Vol-2; FAA-RD-78-33) Avail: NTIS HC A05/MF A01 CSCL 17/7

Airborne measurements of the Air Traffic Control Radar Beacon System (ATCRBS) 1030 MHz uplink environment due to ATC ground interrogators are described. The measurements were made using a special purpose airborne sensor-recorder during a flight from Boston to Washington (at 8500 feet) and back (at 17,500 feet) on 16 December 1977. Data were recorded at 24 locations between Boston and Washington. Specific characteristics of the sources of the interrogations observed from the air during this flight are presented. These characteristics include the identities of 46 of the interrogators, the approximate locations of 22 unidentified interrogators, and the radiated P1, P2, and P3 levels in the form of antenna patterns for six selected interrogators. It was found that approximately 40% of the interrogators employ the standard AAC or 2ACA mode interlaces while 20% transmit no Mode C interrogations. The distributions of PRI's and scan periods were found to be relatively free of bunching which would cause undesired synchronization effects. The antenna plots measured from the air show relatively large scan to scan variations due to aircraft motion. Some of the interrogator sites were found to suffer from reflections and sidelobe punch through effects. S.E.S.

N79-26042# Federal Aviation Administration, Washington, D.C. Office of Systems Engineering Management.
REPORT OF THE FAA TASK FORCE ON AIRCRAFT SEPARATION ASSURANCE. VOLUME 1: EXECUTIVE SUMMARY
N. A. Blake et al Dec. 1978 32 p refs
(AD-A067905; FAA-EM-78-19-1-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 17/7

The system errors, midairs, and near midairs to define the problem were examined. The system element requirements are defined to provide two levels of backup to the ATC system: a separation violation warning and a last-ditch collision advisory and resolution function. The current FAA ASA development programs are discussed, and the changes which are required to transition to an integrated ASA system are reported. S.E.S.

N79-26043# Boston Coll., Chestnut Hill, Mass.
RESEARCH ON AN AUTOMATED INERTIAL AZIMUTH MEASURING SYSTEM Interim Report
William D. Atwill Nov. 1978 38 p refs
(Contract F19628-78-C-0008; AF Proj. 7600)
(AD-A067938; AFGL-TR-78-0285; SR-1) Avail: NTIS HC A03/MF A01 CSCL 19/5

Requirements for highly precise azimuth references for USAF weapons systems have led to an improved automated azimuth measuring system (AAMS). The AAMS represents the state-of-the art for a highly accurate, automated, all-weather azimuth capability which can be used in either a laboratory or specialized field environment. The present system consists of two integrated inertial sensors, an angle transfer system, a tiltmeter array and a microprocessor. The inertial sensors use gimbal-mounted rate gyrocompasses to indicate the azimuths of two transfer mirrors with respect to true North. The azimuths are transferred to any number of reflectors by an autocollimator on a precision indexing table. Sight tubes carry low velocity air along each optical path. Highly sensitive tiltmeters are used to measure and correct for errors due to base motions of the inertial sensors. Data handling and functional operation are controlled by the microprocessor. Recent results indicate a standard deviation of 2.1 arc seconds for a single observation. Proposed improvements include refined support electronics, improved measurements of tilts of the gyrocompasses, increased automation and more extensive software for signal processing. Author (GRA)

05 AIRCRAFT DESIGN, TESTING AND PERFORMANCE

Includes aircraft simulation technology.

For related information see also *18 Spacecraft Design, Testing and Performance* and *39 Structural Mechanics.*

N79-26044 Georgia Inst. of Tech., Atlanta.
A METHOD OF COMPUTING THE PRESSURE DISTRIBUTION ON A SINGLE-BLADED HOVERING HELICOPTER ROTOR Ph.D. Thesis
Koodige Rajarama Shenoy 1979 167 p
Avail: Univ. Microfilms Order No. 7913950

An iterative method was developed to predict accurately the pressure and velocity distributions over the entire blade and particularly near the tip of the rotor. The blade is represented as a sheet of vorticity wrapped around the blade. This sheet is divided into a grid system and the vortex sheet strength is assumed to vary linearly within each panel. The wake vortex sheet geometry and a first approximation to the blade bound vorticity distribution are then computed suing a lifting-line/ blade-element analysis. A new set of vorticity values are obtained by computing the tangential velocity induced at the midpoints of each panel. Geometric coefficients are used in conjunction with the recurrence relations to reduce the computations. The pressure distributions obtained by using the present method of pitch angles of 0 degrees, 6.175 degrees and 11.4 degrees are in good agreement with the experiments. Dissert. Abstr.

N79-26045*# Textron Bell Aerospace Co., Buffalo, N. Y.
AIR CUSHION LANDING GEAR APPLICATIONS STUDY Report, Jan. - Mar. 1979
T. Desmond Earl Apr. 1979 83 p refs
(Contract NAS1-15202)
(NASA-CR-159002; D7605-927002) Avail: NTIS HC A05/MF A01 CSCL 01C

A series of air cushion landing gear (ACLG) applications was studied and potential benefits analyzed in order to identify the most attractive of these. The selected applications are new integrated designs (not retrofits) and employ a modified design approach with improved characteristics and performance. To aid the study, a survey of potential users was made. Applications were evaluated in the light of comments received. A technology scenario is developed, with discussion of problem areas, current technology level and future needs. Feasible development timetables are suggested. It is concluded that near-term development of small-size ACLG trunks, exploration of flight effects and braking are key items. The most attractive applications are amphibious with very large cargo aircraft and small general aviation having the greatest potential. Author

N79-26046*# Textron Bell Helicopter, Fort Worth, Tex.
SYSTEM DESIGN REQUIREMENTS FOR ADVANCED ROTARY-WING AGRICULTURAL AIRCRAFT
Harold E. Lemont May 1979 231 p refs
(Contract NAS1-15153)
(NASA-CR-158938) Avail: NTIS HC A11/MF A01 CSCL 01C

Helicopter aerial dispersal systems were studied to ascertain constraints to the system, the effects of removal of limitations (technical and FAA regulations), and subsystem improvements. Productivity indices for the aircraft and swath effects were examined. Typical missions were formulated through conversations with operators, and differing gross weight aircraft were synthesized to perform these missions. Economic analysis of missions and aircraft indicated a general correlation of small aircraft (3000 lb gross weight) suitability for small fields (25 acres), and low dispersion rates (less than 32 lb/acre), with larger aircraft (12,000 lb gross weight) being more favorable for bigger fields (200 acres) and heavier dispersal rates (100 lb/acre). Operator problems, possible aircraft and system improvements, and selected removal of operating limitations were reviewed into recommendations for future NASA research items. S.E.S.

N79-26047# Army Aviation Engineering Flight Activity, Edwards AFB, Calif.
PRELIMINARY AIRWORTHINESS EVALUATION AH-1S HELICOPTER EQUIPPED WITH A GARRETT INFRARED RADIATION SUPPRESSOR AND AN AN/ALQ-144 JAMMER Final Report
Gary L. Bender, Edward E. Bailes, Charles E. Frankenber, Jr., and Sherwood C. Spring May 1978 79 p
(AD-A067757; USAEFA-77-33) Avail: NTIS HC A05/MF A01 CSCL 01/3

The tests were conducted to determine the effects of installation of the IRS and the AN/ALQ-144 infrared jammer. There was no apparent effect on power required to hover and only a small increase in power required to maintain level flight. Because of a power-available degradation, however, there was a loss of 220 pounds payload in an out-of-ground-effect hover at 4000 feet, 35 C. Additionally, at 2000 feet, 25 C, and 9300 pounds gross weight, there was a reduction in maximum level flight airspeed of 3.5 knots true airspeed in the clean wing configuration. No degradation in handling qualities was caused by IRS or infrared jammer installation. However, one deficiency and six shortcomings inherent in the basic AH-1S were noted. The nonadjustable ventilation system is a deficiency because it blows dirt and dust into the pilot's eyes during operations from unprepared surfaces. GRA

N79-26048# Ministry of Defence, London (England).
HELICOPTER ICING SYMPOSIUM
T. C. Don Nov. 1978 316 p refs Symp. held at London, 6-7 Nov. 1978
(AD-A067981) Avail: NTIS HC A14/MF A01 CSCL 01/3

This document is a collection of papers presented at the Helicopter Icing Symposium, held in London, England, 6-7 November 1978. The emphasis of the symposium was on helicopter rotor blade icing. Papers covered methods of rotor

blade ice protection (electrothermal, ice phobic coatings, microwave, vibratory and mechanical-pneumatic concepts); design and test criteria; ice protection system capabilities and testing and certification methods. Also included are papers on meteorological data; instrumentation; icing tunnel tests and correlations of results to mathematical accretion model; and simulated and natural icing flight tests. Author (GRA)

N79-26049# Naval Ship Research and Development Center, Bethesda, Md. Aviation and Surface Effects Dept.
THE CHARACTERISTICS OF THE SPRAY GENERATED BY THE EFFLUX OF VARIOUS AIRCRAFT PROPULSORS IMPINGING NORMALLY ON WATER Technical Report, May - Sep. 1978
Basil S. Papadales, Jr. Jun. 1978 52 p refs
(WF41421091)
(AD-A067742; DTNSRDC/ASED-78/07) Avail: NTIS HC A04/MF A01 CSCL 01/3

A review of previous model tests of the efflux from aircraft propulsors impinging normally on water is presented. The height of the resulting spray cloud was found to be a function of the maximum dynamic pressure at the surface after impingement, and the propulsor diameter. A generalized relationship using these variables, based on Froude scaling and which favorably compares with the existing model data is presented. Other characteristics of the water surface and spray cloud are discussed, although there are insufficient data to formulate any general conclusions. Results from tests with Froude-scaled vertical takeoff and landing aircraft models are presented. These results are tentative due to the lack of substantiating full-scale data. The height of a spray cloud and the water depression diameter obtained during Froude-scaled tests of a conceptual ducted fan propulsor are also presented. The spray cloud heights compares favorably with the generalized relationship derived from previous tests. The water depression diameter was found to differ substantially from that determined from previous model tests. Spray cloud heights and water depression diameters are predicted for two conceptual full-scale aircraft propulsors. Author (GRA)

N79-26050# Lockheed-California Co., Burbank.
ICING TESTS OF A UH-1H HELICOPTER WITH AN ELECTROTHERMAL ICE PROTECTION SYSTEM UNDER SIMULATED AND NATURAL ICING CONDITIONS Final Report, 31 Jan. - 31 Mar. 1978
R. H. Cotton Apr. 1979 81 p refs
(DA Proj. 1L2-63209-D-103)
(AD-A067737; LR-28667; USARTL-TR-78-48) Avail: NTIS HC A05/MF A01 CSCL 01/3

Natural and simulated icing tests were conducted during February and March 1978 with a UH-1H helicopter equipped with an advanced ice protection system. This was the fourth program of icing tests accomplished with this test aircraft and the second to include natural icing. The objective of this year's program was to expand the icing test envelope, to gather additional data on ice protection system design and performance characteristics, and to obtain specific data for use in a product improvement program for the UH-1 Partial Ice Protection System (Kit A). The testing was conducted at Ottawa, Ontario, Canada. Seven tests in the spray rig and twelve natural icing flights were made totaling 25.8 hours of icing tests. Icing was encountered on seven of the natural icing flights. GRA

N79-26051# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
THE CALCULATION OF OPTIMAL AIRCRAFT TRAJECTORIES
P. E. M. Curtis and D. W. Martin Dec. 1978 18 p refs
(NPL-DNACS-11/78) Avail: NTIS HC A02/MF A01

Two versions of a method for solving the minimum time-to-climb and minimum fuel-to-climb problems are described. This method uses the energy-state approximation to reduce the two problems to univariate minimization problems which are then solved numerically. The first version uses bilinear interpolation of the engine thrust data. This version runs faster on the computer by a factor of between 6 and 8 than a method in operational use. In order to obtain more accurate optimal trajectories a second version was developed which replaces the bilinear interpolation by natural bicubic spline interpolation. The improvement in accuracy is at the expense of a factor of about 2 in the computer run-time compared with the first version, but the gain over the operational method is still a factor of between 3 and 4. Author (ESA)

06 AIRCRAFT INSTRUMENTATION

Includes cockpit and cabin display devices; and flight instruments.

For related information see also *19 Spacecraft Instrumentation* and *35 Instrumentation and Photography*.

N79-26052*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A SIMULATION INVESTIGATION OF COCKPIT DISPLAY OF AIRCRAFT TRAFFIC DURING CURVED, DESCENDING, DECELERATING APPROACHES
George G. Steinmetz May 1979 34 p refs
(NASA-TM-80098) Avail: NTIS HC A03/MF A01 CSCL 01D

The results of a simulation experiment involving the evaluation of cockpit display of aircraft traffic information are presented. The experiment was conducted using taped time dependent, noninteractive traffic in an approach to landing situation and two levels of pilot control models: 3-D automatic and computer augmented control. The tests involved two cases: the simulation aircraft flew approach paths which (1) followed another aircraft in between two other aircraft, and (2) merged between two other aircraft. Speed control via manual throttles was used in all tests (path stretching was not allowed for maintaining separation between aircraft). The approaches were conducted while the simulation aircraft was conducting a curved, descending, decelerating approach to landing. Performance data sets were examined, and subjective opinions regarding workload were gathered. Traffic positioning was varied to further evaluate the test subjects' monitoring performance. S.E.S.

N79-26053# Aeronautical Research Labs., Melbourne (Australia).
AN EXPERIMENTAL COMPARISON OF THE READABILITY OF TWO DIGITAL ALTIMETERS
G. R. White Dec. 1978 25 p
(ARL/Sys-Note-60; AR-001-325) Avail: NTIS HC A02/MF A01

Twelve male volunteer subjects with flying experience were required to read one of two digital altimeters while performing a two dimensional tracking task. It was found that the Smiths Type 3B servo altimeter was read in a significantly shorter time than was the Aero Mechanism Type 8047/20A capsule altimeter. An ergonomic appraisal of the latter instrument and a subjective evaluation by the subjects indicates that the probability of misreading this altimeter is high. Author

N79-26054# Martin Marietta Aerospace, Orlando, Fla.
HIGH ALTITUDE ALTIMETER FLIGHT TEST Final Report, 1 Aug. 1977 - 30 Sep. 1978
W. G. Martin 30 Sep. 1978 157 p
(Contract F33615-77-C-1222; AF Proj. 1995)
(AD-A066904; AFAL-TR-78-143) Avail: NTIS HC A08/MF A01 CSCL 01/4

The HAAFT program was conducted to obtain high altitude radar altimeter data that could be used in a feasibility assessment of High Altitude TERCOM (HATCOM). The HAAFT program involved collecting altimeter data over seven scenes with terrain altitude standard deviations ranging from 25 to 320 feet located in the vicinity of Edward AFB and Point Mugu, California. Two pulse and one FM/CW altimeters were operated simultaneously at nominal altitudes of 5, 20, 30, 45, and 65 kft. AGL. The aircraft three-dimensional position was measured and provided by the AN/FPS-16 radar sets at Edwards AFB and Pt. Mugu. The tracking data were later merged with the data recorded in the aircraft and stored on computer tapes. An inertial navigator was included in the flight test equipment to provide aircraft attitude, velocity, and position data. In addition to the normal altitude measurement data provided by the altimeters, the pulse return waveform for the pulse altimeters and the prediscrimina-

tor waveform for the FM/CW altimeter were processed to be recorded on television video cassette recorders. Author (GRA)

07 AIRCRAFT PROPULSION AND POWER

Includes prime propulsion systems and systems components, e.g., gas turbine engines and compressors; and on-board auxiliary power plants for aircraft.

For related information see also *20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *44 Energy Production and Conversion.*

N79-26055*# Pratt and Whitney Aircraft Group, East Hartford, Conn.

ROTOR REDESIGN FOR A HIGHLY LOADED 1800 FT/SEC TIP SPEED FAN. 1: AERODYNAMIC AND MECHANICAL DESIGN REPORT

J. M. Norton, U. Tari, and R. M. Weber Apr. 1979 104 p refs

(Contract NAS3-20591)

(NASA-CR-159596; PWA-5523-42) Avail: NTIS HC A06/MF A01 CSCL 21E

A quasi three dimensional design system and multiple-circular-arc airfoil sections were used to design a fan rotor. An axisymmetric intrablade flow field calculation modeled the shroud of an isolated splitter and radial distribution. The structural analysis indicates that the design is satisfactory for evaluation of aerodynamic performance of the fan stage in a test facility. S.E.S.

N79-26056*# McDonnell Aircraft Co., St. Louis, Mo.

THRUST AND MASS FLOW CHARACTERISTICS OF FOUR 36 INCH DIAMETER TIP TURBINE FAN THRUST VECTORING SYSTEMS IN AND OUT OF GROUND EFFECT

D. W. Esker and H. A. Roddiger Jun. 1979 105 p refs

(Contract NAS2-9690)

(NASA-CR-152239; MDC-A5704) Avail: NTIS HC A06/MF A01 CSCL 21E

The calibration tests carried out on the propulsion system components of a 70 percent scale, powered model of a NASA 3-fan V/STOL aircraft configuration are described. The three X3/6B/T58 turbotip fan units used in the large scale powered model were tested on an isolated basis over a range of ground heights from H/D of 1.02 to infinity. A higher pressure ratio LF336/J85 fan unit was tested over a range of ground heights from 1.55 to infinity. The results of the test program demonstrated that: (1) the thrust and mass flow performance of the X376B/T58 nose lift unit is essentially constant for H/D variations down to 1.55; at H/D 1.02 back pressurization of the fan exit occurs and is accompanied by an increase in thrust of five percent; (2) a change in nose fan exit hub shape from flat plate to hemispherical produces no significant difference in louvered lift nozzle performance for height variations from H/D = 1.02 to infinity; (3) operation of the nose lift nozzle at the higher fan pressure ratio generated by the LF336/J85 fan system causes no significant change in ground proximity performance down to an H/D of 1.55, the lowest height tested with this unit; and (4) the performance of the left and right X376B/T58 lift/cruise units in the vertical lift mode remains unchanged, within plus or minus two percent for the range of ground heights from H/D = 1.02 to infinity. J.M.S.

N79-26057*# National Aeronautics and Space Administration. Hugh L. Dryden Flight Research Center, Edwards, Calif.

EVALUATION OF A SIMPLIFIED GROSS THRUST CALCULATION TECHNIQUE USING TWO PROTOTYPE F100 TURBOFAN ENGINES IN AN ALTITUDE FACILITY

Frank J. Kurtenbach Jun. 1979 30 p refs

(NASA-TP-1482; H-1061) Avail: NTIS HC A03/MF A01 CSCL 21E

The technique which relies on afterburner duct pressure measurements and empirical corrections to an ideal one dimensional flow analysis to determine thrust is presented. A comparison of the calculated and facility measured thrust values is reported. The simplified model with the engine manufacturer's gas generator model are compared. The evaluation was conducted over a range of Mach numbers from 0.80 to 2.00 and at altitudes from 4020 meters to 15,240 meters. The effects of variations in inlet total temperature from standard day conditions were explored. Engine conditions were varied from those normally scheduled for flight. The technique was found to be accurate to a twice standard deviation of 2.89 percent, with accuracy a strong function of afterburner duct pressure difference. S.E.S.

N79-26058# AiResearch Mfg. Co., Phoenix, Ariz.

ALTERNATE SUBSONIC LOW-COST ENGINE Final Technical Report, 1 Apr. 1976 - 31 Dec. 1977

C. F. Baerst and J. W. Sandborn May 1978 169 p refs

(Contract F33615-76-C-2063)

(AD-A067277; AiResearch-76-212199(21); AFAPL-TR-78-31) Avail: NTIS HC A08/MF A01 CSCL 21/5

This document presents the final report on the research and development of a turbojet derived from low-cost, high-production turbocharger components and an augmentor based on a low-cost, ramjet sudden-expansion burner. The engine, designated AiResearch ETJ131 Moel 1030, is an afterburning derivative of the AiResearch ETJ131 engine. Changes to the basic ETJ131 included placing the combustor parallel to the engine center line, incorporating aerodynamic changes to accommodate the additional airflow required to achieve the thrust goal for the Model 1030, and adding an afterburner. Author (GRA)

N79-26059# AiResearch Mfg. Co., Phoenix, Ariz.

CERAMIC GAS TURBINE ENGINE DEMONSTRATION PROGRAM Quarterly Interim Report, Feb. - Apr. 1978

J. A. Arenare May 1978 200 p refs

(Contract N00024-76-C-5352)

(AD-A067970; AiResearch-76-212188(9); QIR-9) Avail: NTIS HC A09/MF A01 CSCL 21/5

The objective of the 36-month 'Ceramic Gas Turbine Engine Demonstration Program' is to design, fabricate, develop and conduct demonstration tests with ceramic hot-flow-path components for the AiResearch Model TSE331C-1 Engine operating at an average turbine inlet temperature of 2200 F with a peak turbine inlet temperature of approximately 2500 F. The ceramic components for this engine include a reverse-flow annular combustor, turbine blades, and turbine static structure. The Model TSE331C-1 Engine is a turboshaft derivative of the 715-horsepower Model T76-G-10 Engine. Performance improvement goals projected for the engine with the uncooled, high-temperature ceramic components include a 40-percent increase in output power and a 10-percent reduction in specific fuel consumption. This document presents program efforts for the period of February 1, 1978 to April 30, 1978. GRA

N79-26060# Iowa State Univ. of Science and Technology, Ames. Engineering Research Inst.

THE INFLUENCE OF COMPRESSOR INLET GUIDE VANE/STATOR RELATIVE CIRCUMFERENTIAL POSITIONING ON BLADE WAKE TRANSPORT AND INTERACTION Interim Report, 30 Sep. 1977 - 31 Aug. 1978

G. J. Holbrook and T. H. Okiishi Sep. 1978 126 p refs

(Grant AF-AFOSR-2916-76; ERI Proj. 1204)

(AD-A067969; ISU-ERI-AMES-79037; TCRL-13; AFOSR-79-0509TR) Avail: NTIS HC A07/MF A01 CSCL 13/7

A periodically sampling hot-wire measurement system was used to obtain numerous periodic-average (Electronically and arithmetically averaged values of periodically sampled data) three-dimensional velocity vector data for flow through the first stage (inlet guide vane, rotor, and stator rows) of a low-speed, multistage, axial-flow research compressor. New data are presented for the maximum noise circumferential position of the first stator blade row. Comparisons are made between these data and similar data previously acquired and reported for the minimum noise configuration of the compressor. The inlet guide vane (IGV) wake avenue was found to interest first stator row blades at two span locations, one near the hub and the other near the tip, for maximum noise and at only one span location, near mid-span, for minimum noise. This difference in IGV wake / stator leading edge intersection patterns resulted in variations of the first stator exit flow deviation angle near the

hub and tip portions of the compressor annulus. These variations were explained in terms of the larger fluctuations of stator inlet flow associated with the inlet guide vane wake avenues. GRA

N79-26061# ARO, Inc., Arnold Air Force Station, Tenn.
ONLINE MONITORING OF COMPRESSOR BLADE STRESS: AN IMPROVED SYSTEM Final Report, Nov. 1977 - Jul. 1978
Riley B. Fowler AEDC Apr. 1979 74 p refs Sponsored by the Air Force
(AD-A067403; AEDC-TR-79-7) Avail: NTIS HC A04/MF A01 CSCL 21/5

The field of compressor blading design and analysis was researched, and results are presented. The system specifications for an improved online stress-monitoring system are stated on the basis of these results. These specifications are believed to cover present and future test needs. A hardware and software system design is presented which satisfies these specifications. A three-level hardware design is proposed to provide for flexibility, modularity, and expansion. Basic ground rules and concepts for software design are also established. Project resource limitations did not allow recording of alternate analysis methods that were considered in choosing the analysis requirements included in this report (e.g., Fourier analysis on all channels, display of data for operator interpretation). GRA

08 AIRCRAFT STABILITY AND CONTROL

Includes aircraft handling qualities; piloting; flight controls; and autopilots.

N79-26062*# Massachusetts Inst. of Tech., Cambridge. Aeroelastic and Structures Research Lab.
A WIND-TUNNEL INVESTIGATION OF TILT-ROTOR GUST ALLEVIATION SYSTEMS Final Report, 1972 - 1978
Norman D. Ham and H. Philip Whitaker Jan. 1978 140 p refs
(Contract NAS2-7262)
(NASA-CR-152264; ASRL-TR-174-7) Avail: NTIS HC A07/MF A01 CSCL 01C

The alleviation of the effects of gusts on tilt rotor aircraft by means of active control systems was investigated. The gust generator, the derivation of the equations of motion of the rotor wing combination, the correlation of these equations with the results of wind tunnel model tests, the use of the equations to design various gust alleviating active control systems, and the testing and evaluation of these control systems by means of wind tunnel model tests were developed. S.E.S.

09 RESEARCH AND SUPPORT FACILITIES (AIR)

Includes airports, hangars and runways; aircraft repair and overhaul facilities; wind tunnels; shock tube facilities; and engine test blocks.

For related information see also *14 Ground Support Systems and Facilities (Space).*

N79-26063*# Vought Corp., Hampton, Va.
BOEING 747 AIRCRAFT WITH LARGE EXTERNAL POD FOR TRANSPORTING OUTSIZE CARGO
Jack E. Price, C. Baptiste Quartero, Paul M. Smith, and G. Fred Washburn May 1979 21 p refs
(Contract NAS1-13500)
(NASA-CR-159067) Avail: NTIS HC A02/MF A01 CSCL 01C

The effect on structural arrangement, system weight, and range performance of the cargo pod payload carrying capability was determined to include either the bridge launcher or a spacelab module on a Boeing 747 aircraft. Modifications to the carrier aircraft and the installation time required to attach the external pod to the 747 were minimized. Results indicate that the increase in pod size was minimal, and that the basic 747 structure was adequate to safely absorb the load induced by ground or air operation while transporting either payload. S.E.S.

N79-26064*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
FULL-SCALE AIRCRAFT SIMULATION WITH CRYOGENIC TUNNELS AND STATUS OF THE NATIONAL TRANSONIC FACILITY
Robert A. Kilgore, William B. Igoe, Jerry B. Adcock, Robert M. Hall, and Charles B. Johnson Apr. 1979 20 p refs Presented at 1st Internatl. Symp. on Cryog. Wind Tunnels, Southampton, England, 3-5 Apr. 1979
(NASA-TM-80085) Avail: NTIS HC A02/MF A01 CSCL 14B

The effect of thermal and caloric imperfections in cryogenic nitrogen on boundary layers was determined to indicate that in order to simulate nonadiabatic laminar or turbulent boundary layers in a cryogenic nitrogen wind tunnel, the flight enthalpy ratio, rather than the temperature ratio, should be reproduced. The absence of significant real gas effects on both viscous and inviscid flows makes it unlikely that there will be large real gas effects on the cryogenic tunnel simulation of shock boundary layer interactions or other complex flow conditions encountered in flight. Condensation effects were studied to determine the minimum usable temperature and indicated that under most circumstances free stream Mach number rather than maximum local Mach number determines the onset of condensation effects. S.E.S.

N79-26065*# Pennsylvania State Univ., University Park.
THE DYNAMIC MODELLING OF A SLOTTED TEST SECTION
George Gumas May 1979 36 p refs
(Grant NsG-1569)
(NASA-CR-159069) Avail: NTIS HC A03/MF A01 CSCL 14B

A mathematical model of the wind tunnel dynamics was developed. The modelling techniques were restricted to the use of one dimensional unsteady flow. The dynamic characteristics of slotted test section incorporated into the model are presented. S.E.S.

N79-26066# Loughborough Univ. of Technology (England). Dept. of Transport Technology.
DEVELOPMENT OF A TEST FACILITY FOR INVESTIGATING THE RELATIONS BETWEEN NOISE AND INFLOW DISTURBANCE IN AN AIRCRAFT PROPULSION FAN
C. E. Whitfield and J. B. Ollerhead Jul. 1978 89 p refs
(TT-7805; ISSN-0140-9751) Avail: NTIS HC A05/MF A01

The theoretical aero-acoustic transfer function model was extended to account for the correlation of inflow disturbances experienced by different blades. The revised theory was in closer agreement with experimental data from the original fan than the original theory and this reinforces the conclusion that the basic dipole model provides an adequate representation of low speed fan noise generating mechanisms. Preliminary comparisons of theory and experiment for the new higher speed fan were not so encouraging. In particular, the theoretical aero-acoustic transfer function was somewhat greater than the measured. R.E.S.

N79-26067*# Control Data Corp., St. Paul, Minn. Research and Advanced Design Lab.
FEASIBILITY STUDY FOR A NUMERICAL AERODYNAMIC SIMULATION FACILITY: SUMMARY Final Report
N. R. Lincoln May 1979 24 p 4 Vol.
(Contract NAS2-9896)
(NASA-CR-152286) Avail: NTIS HC A02/MF A01 CSCL 14B

The Ames Research Center of NASA is engaged in the development and investigation of numerical methods and computer technologies to be employed in conjunction with physical experiments, particularly utilizing wind tunnels in the furtherance of the field of aircraft and aerodynamic body design. Several studies, aimed primarily at the areas of development and production of extremely high-speed computing facilities, were

conducted. The studies focused on evaluating the aspects of feasibility, reliability, costs, and practicability of designing, constructing, and bringing into effect production of a special-purpose system. An executive summary of the activities for this project is presented in this volume. G.Y.

N79-26068*# Control Data Corp., St. Paul, Minn. Research and Advanced Design Lab.
FEASIBILITY STUDY FOR A NUMERICAL AERODYNAMIC SIMULATION FACILITY. VOLUME 1 Final Report
N. R. Lincoln, R. O. Bergman, D. B. Bonstrom, T. W. Brinkman, S-H. J. Chiu, S. S. Green, S. D. Hansen, D. L. Klein, H. E. Krohn, and R. P. Prow May 1979 626 p refs 4 Vol.
(Contract NAS2-9896)
(NASA-CR-152287) Avail: NTIS HC A99/MF A01 CSCL 14B

A Numerical Aerodynamic Simulation Facility (NASF) was designed for the simulation of fluid flow around three-dimensional bodies, both in wind tunnel environments and in free space. The application of numerical simulation to this field of endeavor promised to yield economies in aerodynamic and aircraft body designs. A model for a NASF/FMP (Flow Model Processor) ensemble using a possible approach to meeting NASF goals is presented. The computer hardware and software are presented, along with the engire design and performance analysis and evaluation. G.Y.

N79-26069*# Control Data Corp., St. Paul, Minn. Research and Advanced Design Lab.
FEASIBILITY STUDY FOR A NUMERICAL AERODYNAMIC SIMULATION FACILITY. VOLUME 2: HARDWARE SPECIFICATIONS/DESCRIPTIONS Final Report
F. M. Green and D. R. Resnick May 1979 474 p 4 Vol.
(Contract NAS2-9896)
(NASA-CR-152288) Avail: NTIS HC A20/MF A01 CSCL 14B

An FMP (Flow Model Processor) was designed for use in the Numerical Aerodynamic Simulation Facility (NASF). The NASF was developed to simulate fluid flow over three-dimensional bodies in wind tunnel environments and in free space. The facility is applicable to studying aerodynamic and aircraft body designs. The following general topics are discussed in this volume: (1) FMP functional computer specifications; (2) FMP instruction specification; (3) standard product system components; (4) loosely coupled network (LCN) specifications/description; and (5) three appendices: performance of trunk allocation contention elimination (trace) method, LCN channel protocol and proposed LCN unified second level protocol. G.Y.

N79-26070*# Control Data Corp., St. Paul, Minn. Research and Advanced Design Lab.
FEASIBILITY STUDY FOR A NUMERICAL AERODYNAMIC SIMULATION FACILITY. VOLUME 3: FMP LANGUAGE SPECIFICATION/USER MANUAL Final Report
B. G. Kenner and N. R. Lincoln May 1979 263 p 4 Vol.
(Contract NAS2-9698)
(NASA-CR-152289) Avail: NTIS HC A12/MF A01 CSCL 14B

The manual is intended to show the revisions and additions to the current STAR FORTRAN. The changes are made to incorporate an FMP (Flow Model Processor) for use in the Numerical Aerodynamic Simulation Facility (NASF) for the purpose of simulating fluid flow over three-dimensional bodies in wind tunnel enfironments and in free space. The FORTRAN programming language for the STAR-100 computer contains both CDC and unique STAR extensions to the standard FORTRAN. Several of the STAR FORTRAN extensions to standard FOR-TRAN allow the FORTRAN user to exploit the vector processing capabilities of the STAR computer. In STAR FORTRAN, vectors can be expressed with an explicit notation, functions are provided that return vector results, and special call statements enable access to any machine instruction. G.Y.

N79-26071*# Burroughs Corp., Paoli, Pa.
NUMERICAL AERODYNAMIC SIMULATION FACILITY FEASIBILITY STUDY, EXECUTIVE SUMMARY
Mar. 1979 24 p refs
(Contract NAS2-9897)
(NASA-CR-152284) Avail: NTIS HC A02/MF A01 CSCL 14B

There were three major issues examined in the feasibility study. First, the ability of the proposed system architecture to support the anticipated workload was evaluated. Second, the throughput of the computational engine (the flow model processor) was studied using real application programs. Third, the availability, reliability, and maintainability of the system were modeled. The evaluations were based on the baseline systems. The results show that the implementation of the Numerical Aerodynamic Simulation Facility, in the form considered, would indeed be a feasible project with an acceptable level of risk. The technology required (both hardware and software) either already exists or, in the case of a few parts, is expected to be announced this year. R.E.S.

N79-26072*# Burroughs Corp., Paoli, Pa.
NUMERICAL AERODYNAMIC SIMULATION FACILITY FEASIBILITY STUDY Final Report
Mar. 1979 615 p
(Contract NAS2-9897)
(NASA-CR-152285) Avail: NTIS HC A99/MF A01 CSCL 14B

There were three major issues examined in the feasibility study. First, the ability of the proposed system architecture to support the anticipated workload was evaluated. Second, the throughput of the computational engine (the flow model processor) was studied using real application programs. Third, the availability reliability, and maintainability of the system were modeled. The evaluations were based on the baseline systems. The results show that the implementation of the Numerical Aerodynamic Simulation Facility, in the form considered, would indeed be a feasible project with an acceptable level of risk. The technology required (both hardware and software) either already exists or, in the case of a few parts, is expected to be announced this year. Facets of the work described include the hardware configuration, software, user language, and fault tolerance. R.E.S.

N79-26073# Aeronautical Research Labs., Melbourne (Australia).
A SIMPLE METHOD OF ADAPTING A WIND TUNNEL SCHLIEREN SYSTEM FOR INTERFEROMETRY
N. Pollock Jun. 1978 44 p refs
(AD-A067233; ARL/AERO-Note-378) Avail: NTIS HC A03/MF A01 CSCL 20/4

A simple method of adapting a wind tunnel Schlieren system for interferometry is described. This new interferometer arrangement employs a laser light source, a lens which splits off the reference beam after test beam expansion and a lens and Lloyd mirror to recombine the two beams. The reference beam passes through the test section but is contracted to a narrow waist and displaced well away from the model location. The proposed design combines a number of favourable characteristics which render it particularly useful for wind tunnel tests. These characteristics include: simplicity, optical robustness, low vibration sensitivity, modest coherence requirements and ease of interferogram analysis. The main disadvantage is that slightly less than half of the total field of view can be recorded on a single interferogram. Interferograms obtained from tests on a prototype instrument based on a Schlieren system of low mechanical rigidity are presented. Also included is a comparison between aerofoil pressure distributions obtained by direct measurement and by interferogram analysis. Author (GRA)

N79-26074# Federal Aviation Administration, Washington, D.C. Office of Management Systems.
AIRPORT ACTIVITY STATISTICS OF CERTIFICATED ROUTE AIR CARRIERS Semiannual Report, 30 Jun. 1978
30 Jun. 1978 312 p Prepared in cooperation with Civil Aeronautics Board, Washington D.C.
(AD-A067924) Avail: NTIS MF A01; HC SOD $7.25 CSCL 01/5

This report furnishes airport activity of the Certificated Route Air Carriers. Included in the data are passenger enplanements, tons of enplaned freight, express, and mail. Both scheduled and non-scheduled service, and domestic and international operations are included. These data are shown by airport and carrier. Departures by airport, carrier and type of operation, and type of aircraft are included. Author (GRA)

12 ASTRONAUTICS (GENERAL)

For extraterrestrial exploration see *91 Lunar and Planetary Exploration.*

N79-26075* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
GENERAL PURPOSE ROCKET FURNACE Patent
Billy R. Aldrich and William D. Whitt, inventors (to NASA) Issued 19 Jun. 1979 17 p Filed 30 Nov. 1976 Supersedes N77-12070 (15 - 03, p 0292)
(NASA-Case-MFS-23460-1; US-Patent-4,158,742; US-Patent-Appl-SN-746578; US-Patent-Class-13-20; US-Patent-Class-13-22; US-Patent-Class-13-24; US-Patent-Class-219-410) Avail: US Patent and Trademark Office CSCL 14B

A multipurpose furnace for space vehicles used for material processing experiments in an outer space environment is described. The furnace contains three separate cavities designed to process samples of the widest possible range of materials and thermal requirements. Each cavity contains three heating elements capable of independent function under the direction of an automatic and programmable control system. A heat removable mechanism is also provided for each cavity which operates in conjunction with the control system for establishing an isothermally heated cavity or a wide range of thermal gradients and cool down rates. A monitoring system compatible with the rocket telemetry provides furnace performance and sample growth rate data throughout the processing cycle.
Official Gazette of the U.S. Patent and Trademark Office

N79-26076*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PROCEEDINGS OF WORKSHOPS TO DEFINE ENGINEERING REQUIREMENTS FOR A SPACE VACUUM RESEARCH FACILITY
W. A. Oran, ed., S. T. Wu, ed. (Alabama Univ. in Huntsville), and R. W. Hoffman, ed. (Case Western Reserve Univ., Ohio) Jun. 1979 152 p refs Workshops held at Huntsville, Ala., 12-13 Jun. 1978 and 3-4 Apr. 1978
(NASA-CP-2091) Avail: NTIS HC A08/MF A01 CSCL 22A

The construction of a molecular wake shield for the shuttle orbiter is presented as well as a collision model with a program depicting emitted molecular density around the spacecraft giving estimates of backscattered flux and other collisional processes. For individual titles, see N79-26077 through N79-26080.

N79-26077*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
PROCEEDINGS OF WORKSHOPS TO DEFINE ENGINEERING REQUIREMENTS FOR A SPACE VACUUM RESEARCH FACILITY: SUMMARY
W. A. Oran *In its* Proc. of Workshops to Define Eng. Requirements for a Space Vacuum Res. Facility Jun. 1979 3 p refs (For primary document see N79-26076 17-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Models depicting the collision dynamics in the near vicinity of a body orbiting in the upper atmosphere were studied to investigate degassing techniques for a vacuum facility. M.M.M.

N79-26078*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
NASA WORKSHOP ON OUTGASSING
In its Proc. of Workshops to Define Eng. Requirements for a Space Vacuum Res. Facility Jun. 1979 17 p refs (For primary document see N79-26076 17-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The materials and processing constraints that are involved in the construction of a molecular wake shield for the shuttle orbiter are discussed. Stainless steel, having outgassing rates less than the required 10 to the minus 12th power Torr-liters/sq cm per second was the primary material suggested for the construction of the shield. M.M.M.

N79-26079*# Alabama Univ. in Huntsville.
REPORT OF THE AD HOC COMMITTEE ON THE ASSESSMENT OF MODELS OF A WAKE SHIELD ENVIRONMENT AROUND VARIOUS SPACECRAFT, UNIVERSITIES SPACE RESEARCH ASSOCIATION Interim Report
S. T. Wu *In* NASA. Marshall Space Flight Center Proc. of Workshops to Define Eng. Requirements for a Space Vacuum Res. Facility Jun. 1979 6 p (For primary document see N79-26076 17-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

Models depicting the ambient atmosphere which can overtake the spacecraft vacuum shield are presented. The subject areas discussed are: possible changing effects on the wake shield environment; possible utilization of the induced environmental contamination monitor; present state of the knowledge of the parameters used to describe the intermolecular collisions; the possibility of using simple models to describe the wake shield environment; possible errors associated with using kinetic theory to calculate that part of the atmosphere overtaking the shield; and a general assessment of the Monte Carlo techniques used to calculate the shield environment. M.M.M.

N79-26080*# Alabama Univ. in Huntsville.
REPORT OF THE AD HOC COMMITTEE ON THE ASSESSMENT OF MODELS OF A WAKE SHIELD ENVIRONMENT AROUND VARIOUS SPACECRAFT, UNIVERSITIES SPACE RES. ASSOCIATION Meeting Report, 3-4 Apr. 1978
S. T. Wu, comp. *In* NASA. Marshall Space Flight Center Proc. of Workshops to Define Eng. Requirements for a Space Vacuum Res. Facility Jun. 1979 20 p (For primary document see N79-26076 17-12)
Avail: NTIS HC A08/MF A01 CSCL 22A

The principles of the Monte Carlo method and its potential were discussed. The prediction of the space shuttle flow field under orbital conditions as well as the backscattering flux were estimated. The collisional processes and the problem of space charging of the space shuttle were reported. M.M.M.

N79-26081# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
RENDEZVOUS MISSIONS TO COMETS WITH ELECTRICALLY SPACECRAFT
Ernst Stuhlinger (Ala. Univ.) and Wolfgang Dittberner Nov. 1978 7 p refs
(TUM-LRT-TB-78/6-1) Avail: NTIS HC A02/MF A01

The use of solar electric power sources on space rendezvous flights is discussed. Recent advances in instrumental spacecraft design, the advent of shuttle launching, and solar-electric propulsion of comet probes are emphasized. Several proposed rendezvous missions to short-period comets with perihelion distances less than 1 AU are cited as feasible examples.
Author (ESA)

13 ASTRODYNAMICS

Includes powered and free-flight trajectories; and orbit and launching dynamics.

N79-26082*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FLIGHT MECHANICS/ESTIMATION THEORY SYMPOSIUM
Arthur J. Fuchs, ed. Apr. 1979 347 p refs Symp. held at Greenbelt, Md., 18-19 Oct. 1978
(NASA-CP-2082; G-7813) Avail: NTIS HC A15/MF A01 CSCL 22A

Onboard and real time image processing to enhance geometric correction of the data is discussed with application to autonomous navigation and attitude and orbit determination. Specific topics covered include: (1) LANDSAT landmark data; (2) star sensing and pattern recognition; (3) filtering algorithms for Global Positioning System; and (4) determining orbital elements for geostationary satellites. For individual titles, see N79-26083 through N79-26098.

N79-26083*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
ONBOARD IMAGE PROCESSING
Donald R. Martin and Alfred S. Samulon *In* NASA. Goddard

Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 1-26 (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The possibility of onboard geometric correction of Thematic Mapper type imagery to make possible image registration is considered. Typically, image registration is performed by processing raw image data on the ground. The geometric distortion (e.g., due to variation in spacecraft location and viewing angle) is estimated by using a Kalman filter updated by correlating the received data with a small reference subimage, which has known location. Onboard image processing dictates minimizing the complexity of the distortion estimation while offering the advantages of a real time environment. In keeping with this, the distortion estimation can be replaced by information obtained from the Global Positioning System and from advanced star trackers. Although not as accurate as the conventional ground control point technique, this approach is capable of achieving subpixel registration. Appropriate attitude commands can be used in conjunction with image processing to achieve exact overlap of image frames. The magnitude of the various distortion contributions, the accuracy with which they can be measured in real time, and approaches to onboard correction are investigated. J.M.S.

N79-26084*# General Electric Co., Philadelphia, Pa. Space Div.
REAL-TIME ONBOARD GEOMETRIC IMAGE CORRECTION
Walter Discenza and Georges Frippel *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 27-48 ref (For primary document see N79-26082 17-13) (Contract NAS5-23412)
Avail: NTIS HC A15/MF A01 CSCL 22A

A system to perform real time onboard geometric connection of LANDSAT D resolution satellite imagery is described. System requirements, algorithms, sensors, and other hardware components are defined. Feasibility of implementing the correction process is demonstrated using Kalman filter techniques to incorporate information from onboard ephemeris, attitude control, and ground control points. Random access sensor systems, such as charge injected devices and charge coupled devices are used to obtain pixel values at desired ground location, thus greatly reducing the data processing requirements. J.M.S.

N79-26085*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A DIGITAL SCENE MATCHING TECHNIQUE FOR GEOMETRIC IMAGE CORRECTION AND AUTONOMOUS NAVIGATION
Glenn E. Tisdale (Westinghouse Electric Co.) and Bernard Peavey *In its* Flight Mech./Estimation Theory Symp. Apr. 1979 p 49-66 (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A02 CSCL 22A

A technique is described for precise registration of two images of the same area, taken under different conditions. The technique, called AUTO-MATCH, involves digital preprocessing of the images to extract edge contours, followed by a correlation of corresponding edge end points. The availability of an array of endpoints makes possible subpixed registration accuracy. The technique is applied to a system for assessment of geometric image quality, to be installed at NASA-Goddard. This system measures the registration vectors over an array of window pairs from LANDSAT images, so as to determine the distortion between them. Similar measurements could be used to infer relative positioning of the spacecraft. The technique is considered for updating the inertial navigation systems of missiles or aircraft. Scene matching between an image obtained aboard the vehicle and a stored reference can eliminate the drift of an inertial platform in order to demonstrate this capability in real time. A laboratory demonstration of AUTO-MATCH is described. J.M.S.

N79-26086*# Computer Sciences Corp., El Segundo, Calif.
ORBIT/ATTITUDE ESTIMATION WITH LANDSAT LANDMARK DATA
D. L. Hall and S. Waligora *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 67-110 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The use of LANDSAT landmark data for orbit/attitude and camera bias estimation was studied. The preliminary results of these investigations are presented. The Goddard Trajectory Determination System (GTDS) error analysis capability was used to perform error analysis studies. A number of questions were addressed including parameter observability and sensitivity, effects on the solve-for parameter errors of data span, density, and distribution an a priori covariance weighting. The use of the GTDS differential correction capability with acutal landmark data was examined. The rms line and element observation residuals were studied as a function of the solve-for parameter set, a priori covariance weighting, force model, attitude model and data characteristics. Sample results are presented. Finally, verfication and preliminary system evaluation of the LANDSAT NAVPAK system for sequential (extended Kalman Filter) estimation of orbit, and camera bias parameters is given. J.M.S.

N79-26087*# TRW Defense and Space Systems Group, Redondo Beach, Calif.
MULTIPLE SCENE ATTITUDE ESTIMATOR PERFORMANCE FOR LANDSAT-1
Samuel S. Rifman, A. T. Monuki, and C. P. Shortwell *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 111-126 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

Initial results are presented to demonstrate the performance of a linear sequential estimator (Kalman Filter) used to estimate a LANDSAT 1 spacecraft attitude time series defined for four scenes. With the revised estimator a GCP poor scene - a scene with no usable geodetic control points (GCPs) - can be rectified to higher accuracies than otherwise based on the use of GCPs in adjacent scenes. Attitude estimation errors was determined by the use of GCPs located in the GCP-poor test scene, but which are not used to update the Kalman filter. Initial results achieved indicate that errors of $<<$ 500m (rms) can be attained for the GCP-poor scenes. Operational factors are related to various scenarios. J.M.S.

N79-26088*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
AUTONOMOUS ATTITUDE ESTIMATION VIA STAR SENSING AND PATTERN RECOGNITION
J. L. Junkins and T. E. Strikwerda *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 127-148 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

Results are reported on the development of an autonomous, onboard, near real time spacecraft attitude estimation technique. The approach uses CCD based star sensors to digitize relative star positions. Three microcomputers are envisioned, configured in parallel, to: (1) determine star image centroids and delete spurious images; (2) identify measured stars with stars in an onboard catalog and determine discrete attitude estimates; (3) integrate gyro rate measurements and determine optimal real time attitude estimates for use in the control system and for feedback to the star identification algorithm. Algorithms for the star identification are presented. The discrete attitude estimation algorithm recovers thermally varying interlock angles between two star sensors. The optimal state estimation process recovers rate gyro biases in addition to real time attitude estimates. J.M.S.

N79-26089*# Honeywell, Inc., St. Petersburg, Fla. Avionics Div.
NAVIGATION AND ATTITUDE REFERENCE FOR AUTONOMOUS SATELLITE LAUNCH AND ORBITAL OPERATIONS
S. P. Kau *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 149-166 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The navigation and attitude reference performance of a strapdown system are investigated for applications to autonomous satellite launch and orbital operations. It is assumed that satellite payloads are integrated into existing missile systems and that the boost, orbit insertion, and in-orbit operation of the satellite are performed autonomously without relying on external support

facilities. Autonomous and long term accurate navigation and attitude reference are provided by a strapdown inertial navigation system aided by a star sensor and earth landmark sensor. Sensor measurement geometry and navigation and attitude update mechanizations are discussed. Performance analysis data are presented for following functional elements: (1) prelaunch alignment; (2) boost navigation and attitude reference; (3) post boost stellar attitude and navigation updates; (4) orbital navigation update using sensor landmark measurements; and (5) in-orbit stellar attitude update and gyro calibration. The system performances are shown to satisfy the requirements of a large class of satellite payload applications. J.M.S.

N79-26090*# Business and Technological Systems, Inc., Seabrook, Md.

MULTIPLE OBJECT TRACKING WITH NON-UNIQUE DATA-TO-OBJECT ASSOCIATION VIA GENERALIZED HYPOTHESIS TESTING

D. W. Porter and R. M. Lefler *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 169-182 (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

A generalized hypothesis testing approach is applied to the problem of tracking several objects where several different associations of data with objects are possible. Such problems occur, for instance, when attempting to distinctly track several aircraft maneuvering near each other or when tracking ships at sea. Conceptually, the problem is solved by first, associating data with objects in a statistically reasonable fashion and then, tracking with a bank of Kalman filters. The objects are assumed to have motion characterized by a fixed but unknown deterministic portion plus a random process portion modeled by a shaping filter. For example, the object might be assumed to have a mean straight line path about which it maneuvers in a random manner. Several hypothesized associations of data with objects are possible because of ambiguity as to which object the data comes from, false alarm/detection errors, and possible uncertainty in the number of objects being tracked. The statistical likelihood function is computed for each possible hypothesized association of data with objects. Then the generalized likelihood is computed by maximizing the likelihood over parameters that define the deterministic motion of the object. Author

N79-26091*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

INTELSAT 4 IN ORBIT LIQUID SLOSH TESTS AND PROBLEMS IN THE THEORETICAL ANALYSIS OF THE DATA

Victor J. Slabinski *In its* Flight Mech./Estimation Theory Symp. Apr. 1979 p 183-221 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The destabilizing effect of the liquid on attitude nutation stability was determined from an extensive series of inorbit tests. The liquid slosh driving frequency ratio (rotor nutation frequency/rotor spin rate) was varied over the range of 0.58 to 0.70 for the tests by rotating the spacecraft antenna platform at different rates in inertial space. A rotor mounted accelerometer sensed the spacecraft nutation. The observed time constant for the nutation angle increase or decrease was corrected for the stabilizing contribution of the platform mounted pendulum dampers to yield the net destabilizing dedamping contribution from the liquid slosh. The in orbit tests show two unexpected maxima in the dedamping contribution at driving frequency ratios that vary with the propellant loading. The rotor nutation frequency at the maxima was about one-third of the lowest mode liquid slosh frequency given by ground test data for unspun tanks, and thus did not correspond to a simple resonance of the liquid. Ground tests with spinning systems produced the same maxima, but the phenomenon is not yet understood. Author

N79-26092*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

SHOE-BOX ORBIT DETERMINATION SYSTEM FOR SMM PRELIMINARY RESULTS

K. K. Tasaki and C. Goorevich (Computer Sciences Corp.) *In its* Flight Mech./Estimation Theory Symp. Apr. 1979 p 225-243 (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The implementation of both sequential and batch methods of estimation on IMP-16 microprocessors was investigated. Simulated data was used from a tracking and data relay satellite whose target satellite was the Solar Maximum Mission. An interesting feature of the hardware was the use of two interconnected IMP-16's. Some preliminary results from the study, as well as the difficulties and advantages in the use of microprocessors, are presented. R.E.S.

N79-26093*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ON-BOARD ORBIT DETERMINATION FOR APPLICATION SATELLITES

G. E. Morduch (Old Dominion Systems, Inc., Gaithersburg, Md.), P. D. Argentiero, and J. G. Lefler (Old Dominion Systems, Inc., Gaithersburg, Md.) *In its* Flight Mech./Estimation Theory Symp. Apr. 1979 p 247-251 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

A proposal for onboard orbit determination which would rely entirely on reference Doppler beacons located within the Continental United States is presented. Algorithms were conceived which were compatible with small computing machines and sufficiently accurate to maintain an adequate satellite ephemeris. An on board computer equipped with a recursive filter with a fading memory to account for dynamic modeling errors and two reference beacons was found to be necessary for the system to work. R.E.S.

N79-26094*# Texas Univ. at Austin. Dept. of Aerospace Engineering and Engineering Mechanics.

A COMPARISON OF FILTERING ALGORITHMS FOR GPS SATELLITE NAVIGATION APPLICATION

B. D. Tapley, J. G. Peters, and B. E. Schutz *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 253-2279 refs (For primary document see N79-26082 17-13)
(Grant NsG-5154)
Avail: NTIS HC A15/MF A01 CSCL 22A

A comparison of three square root filter formulations with the standard extended Kalman filter is described. The characteristics of the algorithms were compared by simulating the application of a phase one GPS system to the determination of a LANDSAT-D Satellite. R.E.S.

N79-26095*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

RELATIVISTIC INFORMATION OF THE GPS-NAVSTAR POSITION DETERMINATION ALGORITHM

W. Baer (Gravitonics Systems Engineering Consultants) *In its* Flight Mech./Estimation on Theory Symp. Apr. 1979 p 281-297 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The use of satellite proper time as integration variable and space time correlation handling were examined for means to reduce computational requirements. Implementation architectures were discussed with emphasis on minimization of computer configuration hardware requirements. Selected benchmark experiment results are presented to size processor requirements for achieving GPS-NAVSTAR navigation accuracies in both the user and control segments. Author

N79-26096*# EG and G Washington Analytical Services Center, Riverdale, Md.

SHORT-TERM SOLAR PRESSURE EFFECT AND GM UNCEGTAINTY ON TDRS ORBITAL ACCURACY: A STUDY OF THE INTERACTION OF MODELING ERROR WITH TRACKING AND ORBIT DETERMINATION

Bertrand T. Fang *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 229-329 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The TDRS was modeled as a combination of a sun-pointing solar panel and earth-pointing plate. Based on this model, explanations are given for the following orbit determination error characteristics: inherent limits in orbital accuracy, the variation of solar pressure induced orbital error with time of the day of

epoch, the insensitivity of range-rate orbits to GM error, and optimum bilateration baseline. Author

N79-26097*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
TRANSFER TRAJECTORY DESIGN FOR A SHUTTLE LAUNCHED GEOSYNCHRONOUS PAYLOAD
R. L. DeFazio *In its* Flight Mech./Estimation Theory Symp. Apr. 1979 p 331-355 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The firing of a fixed impulse spin stabilized upper stage following shuttle deployment of a geosynchronous payload was examined in detail. Design of the transfer trajectory was discussed in terms of finding both a nominal and possible dispersion case that can be handled operationally within the allotted trim fuel budget. R.E.S.

N79-26098*# National Research Council, Pisa (Italy).
SIRIO: ONE YEAR OF STATION KEEPING
F. Palutan and S. Trumpy *In* NASA. Goddard Space Flight Center Flight Mech./Estimation Theory Symp. Apr. 1979 p 359-369 refs (For primary document see N79-26082 17-13)
Avail: NTIS HC A15/MF A01 CSCL 22A

The strategy followed in maintaining the station point and the results achieved are described. The method used for orbit determination is presented. Azimuth and elevation data from SHF antennas were used as input for the determination. An estimation of the uncertainty of the orbit was given and a comparison was made between determinations performed using the method here described and determinations performed using VHF ranging data. Also, the difference in using data from a single SHF station or two stations was shown. In the area of attitude determination, a study was carried out for predicting the spacecraft spin axis precession. The model used was explained and then the agreement between predicted and measured attitude outlined. R.E.S.

N79-26099# Forschungsinstitut fuer Hochfrequenzphysik, Werthhoven (West Germany).
A FAST METHOD FOR DETERMINING THE MEAN ORBITAL ELEMENTS OF AN EARTH SATELLITE
H. G. Peters Mar. 1978 34 p refs In GERMAN; ENGLISH summary Sponsored in Bundesmin. fuer Verteidigung
(Rept-3-78) Avail: NTIS HC A03/MF A01

A method for computing the mean orbital elements from two topocentric position vectors is presented. The orbital parameters are approximated from respective orbital elements of a sequence of Kepler orbits. The determination of Kepler orbital parameters obeys a simple formalism. Moreover, it is possible to forego forming partial derivatives and, therefore, the practical realization of this method minimizes computing time thus allowing real-time processing of observed data on smaller computers. Author (ESA)

14 GROUND SUPPORT SYSTEMS AND FACILITIES (SPACE)

Includes launch complexes, research and production facilities; ground support equipment, mobile transporters; and simulators.

For related information see also *09 Research Support Facilities (Air)*.

No abstracts in this category.

15 LAUNCH VEHICLES AND SPACE VEHICLES

Includes boosters; manned orbital laboratories; reusable vehicles; and space stations.

N79-26100* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
FIRE PROTECTION COVERING FOR SMALL DIAMETER MISSILES Patent
Salvatore R. Riccitiello and Paul M. Sawko, inventors (to NASA) Issued 29 May 1979 7 p Filed 25 Nov. 1977 Supersedes N78-13110 (16 - 03 p 0437)
(NASA-Case-ARC-11104-1; US-Patent-4,156,752; US-Patent-Appl-SN-854920; US-Patent-Class-428-220; US-Patent-Class-260-37EP; US-Patent-Class-260-830S; US-Patent-Class-264-102; US-Patent-Class-264-145; US-Patent-Class-264-151; US-Patent-Class-264-175; US-Patent-Class-264-236; US-Patent-Class-244-121; US-Patent-Class-428-413; US-Patent-Class-428-414; US-Patent-Class-428-418; US-Patent-Class-428-421; US-Patent-Class-428-920) Avail: US Patent and Trademark Office CSCL 16D

Flexible intumescent protection sheeting of unusually uniform thickness were prepared from epoxy-polysulfide compositions, containing microfibers and the ammonium salt of 1,4-nitroaniline-2-sulfonic acid, as disclosed in U.S. Pat. No. 3,663,464, except that an ammonium salt particle size in the order of 5 to 8 microns and a fiber size of about 1/128th inch in length and 3 to 5 microns in diameter were found critical to obtain the required density of 1.46 to 1.50 g/cc. The insulation sheeting was prepared by a continuous process involving vacuum mixing, calendering, and curing under very strict conditions which depend to some extent upon the thickness of the sheet produced.
Official Gazette of the U.S. Patent and Trademark Office

N79-26101*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
MILLIMETER WAVE SATELLITE CONCEPTS. VOLUME 1: EXECUTIVE SUMMARY Report, Jun. 1976 - Jun. 1978
N. B. Hilsen, L. D. Holland, R. W. Wallace, D. L. Kelly, R. E. Thomas, J. J. Gallagher, and F. H. Vogler Jun. 1979 32 p refs 2 Vol.
(Contract NAS3-20110; Georgia Tech. Proj. A-1855)
(NASA-CR-159504) Avail: NTIS HC A03/MF A01 CSCL 22B

The objectives of the program were: (1) development of methodology based on the technical requirements of potential services that might be assigned to millimeter wave bands for identifying the viable and appropriate technologies for future NASA millimeter research and development programs, and (2) testing of this methodology with user applications and services. The scope of the program included the entire communications network, both ground and space subsystems. The reports include: (1) cost, weight, and performance models for the subsystems, (2) conceptual design for point-to-point and broadcast communications satellites, (3) analytic relationships between subsystem parameters and an overall link performance, (4) baseline conceptual systems, (5) sensitivity studies, (6) model adjustment analyses, (7) identification of critical technologies and their risks, (8) brief R&D program scenarios for the technologies judged to be moderate or extensive risks. J.A.M.

N79-26102*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
MILLIMETER WAVE SATELLITE CONCEPTS. VOLUME 2: TECHNICAL REPORT Report, Jun. 1976 - Jun. 1978
N. B. Hilsen, L. D. Holland, R. W. Wallace, D. L. Kelly, R. R. Thomas, and F. H. Vogler May 1979 40 p refs 2 Vol.
(Contract NAS3-20110; Georgia Tech. Proj. A-1855)
(NASA-CR-159503) Avail: NTIS HC A03/MF A01 CSCL 22B

Identification of technologies for millimeter satellite communication systems, and assessment of the relative risks of these technologies, were accomplished through subsystem modeling and link optimization for both point-to-point and broadcast applications. The results, in terms of annual cost per channel to the user from a commercial view point, are described. J.A.M.

N79-26103# National Space Development Agency, Tokyo (Japan).
SPIN AXIS TILT OF SATELLITE INDUCED BY THE INTERNAL FLUID MIGRATION

Masanori Honma and Yasushi Horikawa Jan. 1979 24 p refs In JAPANESE; ENGLISH summary
(NASDA-TR-8) Avail: NTIS HC A02/MF A01

For spin stabilized satellites, the internal fluid (such as fuel or alcohol) in the nutation damper migrates to the position of the local maximum centrifugal force. Then the mass distribution changes, so that the principal axis of moment of inertia deviates from the original design axis. Because the spin axis coincides with the principal axis usually, this deviation, called spin axis tilt, makes further fluid migration. If there is such migration, the spin axis tilt becomes larger than that induced by only the mechanical imbalance. This effect is evaluated as the amplification factor which is a function of the satellite configuration, mass of fluid, and so on. Considering the fluid migration, the spin axis of satellite is not unique, so that the design spin axis is not necessarily stable. According to this, the stability condition of spin axis is derived. A.R.H.

N79-26104# Mission Research Corp., Santa Barbara, Calif.
ON THE LIMITS OF APPLICABILITY OF THE SPACE-CHARGED-LIMITED P-DOT DRIVER Progress Report, Jan. - Jun. 1978
Roger Stettner Jun. 1978 35 p refs
(Contract DNA001-77-C-0009)
(AD-A066131; AD-E000464; MRC-N-343; DNA-4630T) Avail: NTIS HC A03/MF A01 CSCL 20/3

Two limits of applicability of the SGEMP prescribed current source driver, P-dot, are investigated. The first limit considered occurs when the SGEMP boundary layer thickness is smaller than a cell size. The second limit occurs when a significant number of photoelectrons travel to distances comparable with satellite dimensions during times of interest. Suggestions are made for increasing the effectiveness of prescribed source drivers for the second limit. Author (GRA)

N79-26105# Technische Universitaet, Munich (West Germany). Inst. fuer Astronomische und Physikalische Geodaesie.
MEASUREMENTS METHODS APPLIED TO SATELLITE GEODESY: BASIC THEORY [MESSVERFAHREN DER SATELLITENGEODAESIE GRUNDLAGEN]
Manfred Schneider and Dieter Egger 1978 63 p refs In GERMAN; ENGLISH summary Sponsored by Deut. Forschungsgemeinschaft
(TUM-MITT-145) Avail: NTIS HC A04/MF A01

Starting with some fundamentals of the theory of waves, the propagation of wave packets, mainly in media with dispersion, was considered. Special attention was given to changes in a wave packet concerning direction, velocity and shape. The earth's atmosphere was used as an example of a dispersive medium. Its influence on the achievable accuracy of laser ranging to satellites is demonstrated. Author (ESA)

N79-26106# Royal Aircraft Establishment, Farnborough (England).
RELIABILITY AND LAUNCHING POLICY FOR A SYSTEM OF SATELLITES
Theresa F. Klaschka Jul. 1978 32 p ref
(RAE-TR-78081; BR65872) Avail: NTIS HC A03/MF A01

The reliability of a system of satellites in which a number of satellites are launched at intervals is analyzed. The system is considered operational if at least one satellite in orbit is functioning. Analytical methods were investigated for determining a launching policy which would optimize some suitable system reliability parameter, but only a near-optimal policy could be found. The equations derived provide expressions for the reliability and mean downtime of the system within each time interval between successive launches and throughout the mission. The reliability model which was used included redundancy within the satellite, a launch success probability, and a satellite cut-off time (or end of life) due to fuel exhaustion. Author (ESA)

16 SPACE TRANSPORTATION

Includes passenger and cargo space transportation e.g., shuttle operations; and rescue techniques.

For related information see also *03 Air Transportation and Safety* and *85 Urban Technology and Transportation.*

N79-26107*# M&S Computing, Inc., Huntsville, Ala. STS Software Dept.
INERTIAL UPPER STAGE (IUS) SOFTWARE ANALYSIS Final Report
W. L. Grayson, C. E. Nickel, P. L. Rose, and R. P. Singh 14 Jun. 1979 112 p refs
(Contract NAS8-33072)
(NASA-CR-161251; Rept-79-020) Avail: NTIS HC A06/MF A01 CSCL 22B

The Inertial Upper Stage (IUS) System, an extension of the Space Transportation System (STS) operating regime to include higher orbits, orbital plane changes, geosynchronous orbits, and interplanetary trajectories is presented. The IUS software design, the IUS software interfaces with other systems, and the cost effectiveness in software verification are described. Tasks of the IUS discussed include: (1) design analysis; (2) validation requirements analysis; (3) interface analysis; and (4) requirements analysis. S.E.S.

N79-26108# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
LOW COST SPACE TRANSPORTATION
H. O. Ruppe, R. H. Schmucker, W. Dittberner, D. Hayn, and M. Braitinger 8 Oct. 1978 40 p refs Presented at IAF Congr., 1-8 Oct., 1978, Dubrovnik, Yugoslavia
(TUM-LRT-TB-78/6-2; IAF-Paper-78/A26) Avail: NTIS HC A03/MF A01

Three different space transportation systems are discussed in view of improving the cost/benefit ratio per mission. Different approaches include recoverable and reusable material, various simple designs for each stage used in an expendable mode, and multistage vehicles made up of an appropriate number of the same basic modules. Even taking into consideration mass production savings on equipment developed on the simplified high modular structure principle and the possibility of low cost propellants, cost analysis results show that no other system seems as promising for long run transportation cost reduction as the reusable, highly refined systems now available. Author (ESA)

17 SPACECRAFT COMMUNICATIONS, COMMAND AND TRACKING

Includes telemetry; space communications networks; astronavigation; and radio blackout.

For related information see also *04 Aircraft Communications and Navigation* and *32 Communications.*

No abstracts in this category.

18 SPACECRAFT DESIGN, TESTING AND PERFORMANCE

Includes spacecraft thermal and environmental control; and attitude control.

For life support systems see *54 Man/System Technology and Life Support*. For related information see also *05 Aircraft Design, Testing and Performance* and *39 Structural Mechanics*.

No abstracts in this category.

19 SPACECRAFT INSTRUMENTATION

For related information see also *06 Aircraft Instrumentation* and *35 Instrumentation and Photography*.

No abstracts in this category.

20 SPACECRAFT PROPULSION AND POWER

Includes main propulsion systems and components e.g., rocket engines; and spacecraft auxiliary power sources.

For related information see also *07 Aircraft Propulsion, 28 Propellants and Fuels*, and *44 Energy Production and Conversion*.

N79-26109# Royal Aircraft Establishment, Farnborough (England).

A REVIEW OF THE UK T5 ELECTRON-BOMBARDMENT MERCURY ION THRUSTER

D. G. Fearn Feb. 1978 44 p refs Presented at the ESTEC Conf. on Attitude and Orbit Control Systems, Noordwijk, Holland, 3-6 Oct. 1977

(RAE-TR-77191; BR62897) Avail: NTIS HC A03/MF A01

Technical status of the T5 10cm diameter ion thruster is reviewed with reference to performance characteristics of interest to the north-south stationkeeping of long life communications spacecraft. The derivation of this thruster from the T4A device is described and details of relevant test programs are given. It is shown that its corrected mass utilization efficiency of almost 90%, its modest energy consumption of under 230 W at 10 mN thrust, and the proven lifetime of over 5000 hours of its components makes it a suitable choice for many missions. It is also demonstrated that the deposition of contaminants derived from the thruster onto the solar arrays of a communications spacecraft should remain within acceptable limits for more than 5000 hours of thruster operation. The wide throttling range available provided a further attractive feature. Brief details are given of the propellant tank, valve, and flowmeter being developed in parallel with the thruster. J.A.M.

N79-26110*# Colorado State Univ., Fort Collins. Dept. of Mechanical Engineering.

INERT GAS THRUSTERS Annual Report

Harold R. Kaufman Nov. 1978 88 p refs

(Grant NsG-3011)

(NASA-CR-159527) Avail: NTIS HC A05/MF A01 CSCL 21H

Inert gas thrusters have continued to be of interest for space propulsion applications. Xenon is of interest in that its physical characteristics are well suited to propulsion. High atomic weight and low tankage fraction were major factors in this choice. If a large amount of propellant was required, so that cryogenic storage was practical, argon is a more economical alternative. Argon was also the preferred propellant for ground applications of thruster technology, such as sputter etching and deposition. Additional magnetic field measurements are reported. These measurements should be of use in magnetic field design. The diffusion of electrons through the magnetic field above multipole anodes was studied in detail. The data were consistent with Bohm diffusion across a magnetic field. The theory based on Bohm diffusion was simple and easily used for diffusion calculations. Limited startup data were obtained for multipole discharge chambers. These data were obtained with refractory cathodes, but should be useful in predicting the upper limits for starting with hollow cathodes. J.A.M.

N79-26111# Technische Univ., Berlin (West Germany). Inst. fuer Luft- und Raumfahrt.

PERFORMANCE AND HEAT TRANSFER OF HIGH ENERGY ROCKET ENGINES WITH THRUST VARIATION [LEISTUNGSUERHALTEN UND WAERMETRANSPORT HOCHENERGETISCHER RAKETENTRIEBWERKE BEI SCHUBVARIATION]

Hans J. Sternfeld 1977 181 p refs In GERMAN; ENGLISH summary

(ILR-21; ISBN-3-7983-05090-0) Avail: NTIS HC A09/MF A01

The effects of various parameters on the experimental performance and the hot gas side heat transfer rates of oxygen/hydrogen, fluorine/hydrogen, and fluorine/ammonia rocket engines were investigated. A thrust variation between 200 and 1500 N of these engines was provided by a variation of the combustion chamber pressure. A novel procedure was applied for determining the heat transfer coefficient from the measured unsteady wall temperature distribution in the nozzle and combustion chamber. The experimental performance of a flourine/ammonia rocket engine was compared with results obtained with the DER computer model. Results of the investigation are presented as two-dimensional approximation functions. Author (ESA)

N79-26112# Propellants, Explosives and Rocket Motor Establishment, Westcott (England).

CONSTRUCTION OF A HIGH PERFORMANCE RESISTOJET FOR SATELLITE PROPULSION

P. J. Sherwood London Defense Res. Inform. Centre Nov. 1978 25 p refs Presented at 4th Brit. Interplanetary Soc. Symp. on Mater. in Space Technol., London, 29-30 Sep. 1971 (PERME-TR-99; BR65610) Avail: NTIS HC A02/MF A01

The fabrication and assembly of a 3 kW resistojet thruster employing hydrogen as a propellant are described with particular reference to the materials problems involved. Rhenium was selected as the most suitable material for the concentric tubular heat exchanger which must operate at temperatures up to 2500 K in flowing hydrogen for a minimum period of 200 hours, with temperature cycling. Because of the complex ageometry and close tolerances required, thin walled rhenium tubes were made by a chemical vapor-deposition technique. Rhenium parts were joined by electron beam welding. Author (ESA)

N79-26113# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.

PERFORMANCE OF LOW THRUST ATTITUDE CONTROL ENGINES. PART 1: NOZZLE FLOW AND PERFORMANCE PREDICTION

D. Hayn and R. H. Schmucker Dec. 1977 48 p refs 6 Vol. (TUM-LRT-TB-77/5-Pt-1) Avail: NTIS HC A03/MF A01

Nozzle flow and performance prediction of chemical low thrust attitude control engines were studied, particularly the Power Augmented Electrothermal Hydrazine Thruster (PAEHT). Of the various examined losses including energy release, kinetics, two dimensional flow, and boundary layer with heat losses, the last two affect the delivered performance most. Therefore, results confirm the necessity of boundary layer loss predictions based upon both calculation and evaluation of empirical data. Author (ESA)

N79-26114# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.

PERFORMANCE OF LOW THRUST ATTITUDE CONTROL ENGINES. PART 2: HYDRAZINE ENGINES THEORETICAL

PERFORMANCE AND TRANSPORT PROPERTIES OF REACTION PRODUCTS
D. Hayn, U. Stein, and R. H. Schmucker Apr. 1978 42 p refs 6 Vol.
(TUM-LRT-TB-77/6-Pt-2) Avail: NTIS HC A03/MF A01

To predict the performance of low thrust hydrazine engines the theoretical performance as well as the thermodynamic and transport properties were studied. Data on the ammonia dissociation fraction, governed by the processes within the combustion chamber were analyzed. The analysis is based on the assumption of a partial equilibrium which only considers the fraction of ammonia dissociated while the residual gases are not taken into account. Although this approach is only correct for frozen flow and equilibrium flow with completely dissociated ammonia within the chamber, the results derived can be used as a first estimate for evaluation of the effects of changing chemical composition during expansion, especially since in small scale nozzles the flow tends to freeze upstream of the throat.
Author (ESA)

N79-26115# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
PERFORMANCE OF LOW THRUST ATTITUDE CONTROL ENGINES. PART 3: POWER AUGMENTED HYDRAZINE PERFORMANCE AND THERMODYNAMIC PROPERTIES OF REACTION PRODUCTS
D. Hayn, U. Stein, and R. H. Schmucker Apr. 1978 30 p refs 3 Vol.
(TUM-LRT-TB-77/7-Pt-3) Avail: NTIS HC A03/MF A01

In order to increase the vacuum specific impulse of a conventional monopropellant hydrazine engine the two stage approach of a classical thruster and an electrical combustion chamber heater was studied. This Power Augmented Electrothermal Hydrazine Thruster (PAEHT) uses excess power from the satellite power system to raise the chamber temperature to the upper level tolerated by the wall material. The performance of a PAEHT depends on the hydrazine decomposition mode and the power supply. Results correlate different chamber temperatures with power augmentation. Transport properties, evaluated in the temperature range of interest, show a nearly negligible effect of pressure so that for boundary layer evaluation only a transport property--temperature relation is required. Author (ESA)

N79-26116# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
PERFORMANCE OF LOW THRUST ATTITUDE CONTROL ENGINES. PART 4: CORRELATION EQUATION FOR EXPERIMENTAL BOUNDARY LAYER LOSSES
D. Hayn and R. H. Schmucker Oct. 1977 32 p refs 6 Vol.
(TUM-LRT-TB-77/14-Pt-4) Avail: NTIS HC A03/MF A01

For the correlation of experimental data, a formula which comprises data on chamber pressure, nozzle geometry, and thermodynamic properties of combustion products was derived. Analytical evaluation of boundary layer equations, by which characteristic scaling parameters can be derived, gives a means for extrapolation of available performance data on small scale nozzles, where viscous effects play an important role in the performance degradation and the accuracy of theoretical calculations of boundary layer losses is not well known. This method is superior to purely empirical considerations since physical tendencies are comprised in such an equation.
Author (ESA)

N79-26117# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
PERFORMANCE OF LOW THRUST ATTITUDE CONTROL ENGINES. PART 5: THRUST LOSS DETERMINATION BY TEST-DATA-CORRELATION
D. Hayn and R. H. Schmucker Jul. 1978 57 p refs 6 Vol.
(TUM-LRT-TB-78/1-Pt-5) Avail: NTIS HC A04/MF A01

A simplified method for the explicit determination of boundary layer values was used on account of the mathematical complexity of the Navier-Stokes equations and the unavailability of applicable computer programs. In order to verify this simplified method various experimental data on N2, H2, Argon, Freon 14, and N2H4 as propellant were compared with theoretical results. The investigation included error deviations in measurements since, in the case of very small-scaled nozzles, the influence of thrust- and mass-flow deviations is very important. Results show that the accuracy of performance predictions including losses is within measurement accuracy. Author (ESA)

N79-26118# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
PERFORMANCE OF LOW THRUST ATTITUDE CONTROL ENGINES. PART 6: COMPUTATION OF BOUNDARY LAYER LOSSES
D. Hayn and R. H. Schmucker Jul. 1978 73 p refs 6 Vol.
(TUM-LRT-TB-78/2-Pt-6) Avail: NTIS HC A04/MF A01

A simplified method for the explicit determination of boundary layer values was used as an alternative to the mathematical complexity of the Navier-Stokes equations and because of the unavailability of applicable computer programs. A simplified type of velocity profile between wall and core stream, which is possible for great Mach numbers, was assumed. Results according to thermodynamic properties and some other details are used to integrate the boundary layer momentum equation by a difference scheme starting in the engine-chamber. The nozzle shape must be corrected because of the boundary layer influence on the real flow. For this study a core stream correction which has the same result as a shape one was made. The pressure distribution at the nozzle and two-dimensional flow also necessitated corrections. Author (ESA)

23 CHEMISTRY AND MATERIALS (GENERAL)

Includes biochemistry and organic chemistry.

N79-26119 Illinois Univ. at Urbana-Champaign, Urbana.
THE DECOMPOSITION OF POLYCYCLIC ORGANIC MATTER ADSORBED ON COAL FLY ASH Ph.D. Thesis
Walter Averill Korfmacher 1978 281 p
Avail: Univ. Microfilms Order No. 7913518

Polycyclic aromatic hydrocarbons (PAH) and their derivatives, including the nitrogen heterocycles, can be collectively referred to as polycyclic organic matter (POM). While it is now known that POM is adsorbed onto the coal fly ash emitted from coal-fired power plants, the fate of this POM in the atmospheric environment is unclear. Several PAH (pyrene, fluoranthene, phenanthrene, benzo(a)pyrene, anthracene) were vapor-adsorbed onto coal fly ash and then irradiated using one of several light sources. An effort was made to simulate ground level sunlight in spectral intensity and distribution in choosing these conditions. Both the analytical and environmental significance of this study are also discussed as possible explanations for the findings.
Dissert. Abstr.

24 COMPOSITE MATERIALS

Includes laminates.

N79-26120*# Boeing Aerospace Co., Seattle, Wash.
EVALUATION OF FLAWED COMPOSITE STRUCTURAL COMPONENTS UNDER STATIC AND CYCLIC LOADING
T. R. Porter Feb. 1979 255 p refs
(Contract NAS3-19709)
(NASA-CR-135403) Avail: NTIS HC A12/MF A01 CSCL 11D

The effects of initial defects on the fatigue and fracture response of graphite-epoxy composite laminates are presented. The structural laminates investigated were a typical angle ply laminate, a polar/hoop wound pressure vessel laminate, and a typical engine fan blade laminate. Defects investigated were full and half penetration circular holes, full and half penetration slits, and countersink holes. The effects of the defect size and type on the static fracture strength, fatigue performance, and residual static strength are shown as well as the results of loadings on damage propagation in composite laminates. The data obtained were used to define proof test levels as a qualification procedure in composite structure subjected to cyclic loading. A.R.H.

N79-26121# California Univ., Livermore. Lawrence Livermore Lab.
PROTOTYPE DEVELOPMENT OF AN OPTIMIZED, TAPERED-THICKNESS, GRAPHITE/EPOXY COMPOSITE FLYWHEEL
S. V. Kulkarni, R. G. Stone, and R. H. Toland Nov. 1978 37 p refs
(Contract W-7405-eng-48)
(UCRL-52623) Avail: NTIS HC A03/MF A01

The design, fabrication, and testing of a prototype composite flywheel rotor are described and its potential as an efficient energy-storage device is assessed. The basic laminate layup for the composite flywheel was quasi-isotropic (0/+-45/90), and the design was based on an ultimate strain failure criterion that stipulates simultaneous failure in the radial and hoop directions. The energy density of the flywheel rotor as obtained from the burst speed test was 28.4 W.h/lb (0.225 MJ/kg). Although this is a fairly high number, it still was lower than the predicted value of 54.8 W.h/lb (0.435 MJ/kg). Based on the laminate coupon data obtained from the scratch material machined out of the rotor as well as on those data obtained from panels supplied by the prepreg manufacturer, possible reasons for this lower-than-expected energy density are identified. Finally, recommendations are made for further development of the optimized rotor concept. DOE

25 INORGANIC AND PHYSICAL CHEMISTRY

Includes chemical analysis, e.g., chromatography; combustion theory; electrochemistry; and photochemistry.

For related information see also *77 Thermodynamics and Statistical Physics.*

N79-26122 California Univ., Los Angeles.
RAMAN STUDIES OF THE ORIENTATIONAL MOTIONS OF SMALL DIATOMICS DISSOLVED IN ARGON, 1; AND MOLECULAR DYNAMICS SIMULATION OF RARE GAS FILMS ADSORBED ON THE BASAL PLANE OF GRAPHITE, 2 Ph.D. Thesis
Frank Edward Hanson 1979 218 p
Avail: Univ. Microfilms Order No. 7913727

A study was made of the orientational motions of oxygen and nitrogen dissolved in argon, using Raman spectroscopy. First, second and fourth moments are reported for the rotation and vibration-rotation bands of these molecules at various concentrations along the liquid-vapor coexistence curve. Molecular dynamics calculations of the DID collision-induced contribution to the vib-rot spectra are reported. Even leaving out the high frequency overlap mechanism, the effect on the second moment was surprisingly large. A molecular dynamics computer simulation of the melting of adsorbed argon and krypton films at constant density on the (100) graphite surface was made. Both lateral and vertical surface potentials were modeled for Lennard-Jones systems at coverages up to a monolayer and temperatures spanning the solid and fluid ranges. Dissert. Abstr.

N79-26123 Georgia Univ., Athens.
EXPERIMENTAL STUDIES OF COHERENT ANTI-STOKES RAMAN SPECTROSCOPY IN LIQUIDS Ph.D. Thesis
Larry Ponde Goss 1978 264 p
Avail: Univ. Microfilms Order No. 7914028

Experiments to determine the signs of the imaginary damping factors in the resonance denominators of the expressions for the third order susceptibilities governing coherent anti-Stokes and coherent Stokes Raman spectroscopy (CARS and CSRS) were carried out using a spectral line of beta-carotene. The experimental results are compared to the two different theoretical results predicted by the fully quantum mechanical and the semiclassical calculations for the third order susceptibilities for CARS and CSRS. Dissert. Abstr.

N79-26124 Georgetown Univ., Washington, D.C.
THERMODYNAMIC STUDIES OF TERNARY MIXTURES BY GAS-LIQUID CHROMATOGRAPHY Ph.D. Thesis
Michael William Patrick Harbison 1978 152 p
Avail: Univ. Microfilms Order No. 7913983

Alkane, cycloalkane and aromatic solutes were studied in 12 mixtures of dinonylphthalate (DNP) and Squalane (SQ). Alkane and haloalkane solutes were studied in 12 mixtures of dioctylether and octadecane. The resulting partition coefficients were compared with static partial pressure measurements and the predictions of two solution models. The average percent difference between the GLC and static partition coefficients in pure SQ, pure DNP and their mixtures was 0.6%. A solution model was consistent with the experimental data for both associating and nonassociating systems. Two previous methods of determining association constants were compared with this new method. The pure base method, which is applicable to 1:1 complexes only, was accurate only if a good nonpolar analogue is available to mimic the physical interactions of the solute. Dissert. Abstr.

N79-26125 Illinois Univ. at Urbana-Champaign, Urbana.
FLUORESCENCE MEASUREMENTS ON A MINIDISC CENTRIFUGAL ANALYZER WITH A PULSED NITROGEN LASER SOURCE Ph.D. Thesis
Mark James Simmons 1978 172 p
Avail: Univ. Microfilms Order No. 7913611

The centrifugal analyzer described provides a high sample throughput with the parallel mixing of small volumes of reagent and sample on a multicuvette disc. The use of a pulsed nitrogen laser as the excitation source with the centrifugal analyzer represents a unique application of this type of light source. The rotating disc of the centrifugal analyzer imposes a short aperture time on the excitation source. If a conventional continuous (cw) source is used, the aperture time for a given cuvette results in low duty cycle modulation of the cw source with no compensating increase in peak power from the source. The emission of the nitrogen laser near 340 nm permits the application to a wide variety of clinical fluorescence methods. Dissert. Abstr.

N79-26126 Illinois Univ. at Urbana-Champaign, Urbana.
ACCURATE CHEMICAL CHARACTERIZATION BY FLUORESCENCE SPECTROMETRY Ph.D. Thesis
Kalvin Wai-Kin Yim 1978 128 p
Avail: Univ. Microfilms Order No. 7913667

A computer based file searching technique was developed for detailed comparison of fluorescence spectra. Data compression was achieved by Fourier transformation of the spectra, and search based on comparison of limited arrays of Fourier components. Tests were made with the worst available cases, viz., the ring-alkylated phenols, which could not be distinguished from each other by earlier techniques for searching fluorescence files. Identifications were achieved by the present method in every tested case. The optimum number of Fourier components used in the comparison was shown about 10. Dissert. Abstr.

N79-26127 Colorado School of Mines, Golden.
A PORE MODEL FOR GASIFICATION REACTIONS: AN APPLICATION TO THE SYSTEM C-CO2-CO-N2 Ph.D. Thesis
Marcelo DeMatos 1978 268 p
Avail: Univ. Microfilms Order No. 7912222

A model is described which accounts for structural changes in a pellet (porosity, radius of pore, size of the pellet) as reaction proceeds. The equation describing the model was cast in dimensionless form which allows for study of the system in terms of dimensionless groups rather than individual parameters. The theoretical predictions of experimental runs indicates that the model can be used to describe the behavior of spherical pellets of electrode graphite when reacted with CO2 or CO2/N2 mixtures, in the temperature range 970 to 1000 C. However, because of the nature of the graphite (low porosity and high chemical reactivity at the temperature of the runs) the behavior corresponds to the limiting case of surface reaction control for the model. Dissert. Abstr.

N79-26128 State Univ. of New York at Buffalo.
STUDIES ON FLAME PROPAGATION IN POWDERED MIXTURES Ph.D. Thesis
Chandran Santanam 1978 147 p
Avail: Univ. Microfilms Order No. 7905314

The influence of mixture ratio, chamber pressure, porosity, initial conditions, powder diameter, propellant content and boundary conditions on burning rate performance were studied both experimentally and theoretically. The ballistic behavior of loose powder combustion indicates performance trends analogous to cast solid propellant within the low combustion pressure range. The influence of mixture ratio and chamber pressure on burning rate are substantial. The experiments were limited to combustion chamber pressures below 400 psi. The powder bed mixture for the investigation is a three part system containing ammonium perchlorate, polyethylene and aluminum. The theoretical work involved describes the flame propagation in a packed bed for different boundary conditions. Dissert. Abstr.

N79-26129 Illinois Univ. at Urbana-Champaign.
STEADY STATE AND STABILITY CHARACTERISTICS OF CATALYTIC ARRAYS Ph.D. Thesis
Theodore Thomas Tsotsis 1978 305 p
Avail: Univ. Microfilms Order No. 7913644

The steady state characteristics and the stability behavior of different arrays of catalyst particles are studied. Various Arrhenius type reaction forms are used, including first order, positive order, and Langmuir Hinshelwood Kinetics. Nonuniform states are found to exist inside a well-defined range of conditions. Their stability behavior is analyzed and is shown, in most cases, to be invariant under the change of connectivity parameters. Different geometric networks are examined and striking similarities between them exist. The uniform states are examined and exact necessary and sufficient conditions for pattern forming instabilities are derived. All these phenomena are shown to have possible important impact on catalytic reactor performance including productivity, selectivity, and thermal behavior. Dissert. Abstr.

N79-26130 Colorado School of Mines, Golden.
LIQUID-VAPOR EQUILIBRIUM MEASUREMENT AND PREDICTION OF THE BINARY AND TERNARY SYSTEMS CONSISTING OF METHANE, ETHANE, AND CARBON DIOXIDE AT 270.00 K Ph.D. Thesis
Robert Earl Phelps 1978 152 p
Avail: Univ. Microfilms Order No. 7912228

Theoretical treatment of the data was carried out using the following four equations of state: (1) Peng-Robinson; (2) Harmens; (3) Soave; and (4) Modified Benedict-Webb-Rubin. The Bendict-Webb-Rubin equation, using the corresponding states principle, gave the best prediction of the experimental data. The Soave equation gave the least accurate prediction, especially with those systems involving carbon dioxide. The Peng-Robinson equation was used to test the behavior of these interaction coefficients over a wide temperature range for each binary isotherm contained within this report. Dissert. Abstr.

N79-26131 Minnesota Univ., Minneapolis.
GROWTH AND STRUCTURE OF ION BEAM SPUTTERED THIN FILMS OF GOLD AND CADMIUM SULFIDE ON SILICON SUBSTRATE Ph.D. Thesis
Jae In Lee 1978 120 p
Avail: Univ. Microfilms Order No. 7912041

Both alloy and compound formations produced by the direct reactions between substrate and impinging atoms were investigated in detail using in situ transmission electron microscopy. Gold and cadmium sulfide were respectively ion beam sputtered on the silicon substrate with the variation of the substrate temperature for the study of an alloy and a compound formation. It was found that in the alloy formation the diffusion was the most important parameter which influences the growth of the thin films, while in the compound formation the free energy change of the reaction involved in the deposition process was the most important. Dissert. Abstr.

N79-26132*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
INVESTIGATION OF THE FREE FLOW ELECTROPHORETIC PROCESS. VOLUME 1: EXECUTIVE SUMMARY Final Report
Ronald A. Weiss, James W. Lanham, David W. Richman, and Charles D. Walker May 1979 27 p refs 2 Vol.
(Contract NAS8-32200)
(NASA-CR-161241; MDC-E2000-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 07D

The effect of gravity on the free flow electrophoretic process was investigated. The demonstrated effects were then compared with predictions made by mathematical models. Results show that the carrier buffer flow was affected by gravity induced thermal convection and that the movement of the separating particle streams was affected by gravity induced buoyant forces. It was determined that if gravity induced buoyant forces were included in the mathematical models, then effective predictions of electrophoresis chamber separation performance were possible. R.E.S.

N79-26133*# McDonnell-Douglas Astronautics Co., St. Louis, Mo.
INVESTIGATION OF THE FREE FLOW ELECTROPHORETIC PROCESS. VOLUME 2: TECHNICAL ANALYSIS Final Report
Ronald A. Weiss, James W. Lanham, David W. Richman, and Charles D. Walker May 1979 150 p refs 2 Vol.
(Contract NAS8-32200)
(NASA-CR-161240; MDC-E2000-Vol-2) Avail: NTIS HC A07/MF A01 CSCL 07D

The effect of gravity on the free flow electrophoretic process was investigated. The demonstrated effects were then compared with predictions made by mathematical models. Results show that the carrier buffer flow was affected by gravity induced thermal convection and that the movement of the separating particle streams was affected by gravity induced buoyant forces. It was determined that if gravity induced buoyant forces were included in the mathematical models, then effective predictions of electrophoresis chamber separation performance were possible. The results of tests performed using various methods of electrophoresis using supportive media show that the mobility and the ability to separate were essentially independent of concentration, providing promise of being able to perform electrophoresis with higher inlet concentrations in space. R.E.S.

N79-26134# Aerospace Corp., El Segundo, Calif. Chemistry and Physics Lab.
EFFECT OF VIBRATIONAL EXCITATION IN REACTIONS OF OH WITH H2 Interim Report
Glenn C. Light and James H. Matsumoto 15 Aug. 1978 13 p refs
(Contract F04701-77-C-0078)
(AD-A058571; TR-0078(3970-40)-3; SAMSO-TR-78-78) Avail: NTIS HC A02/MF A01

Upper limits were deduced at T approx. 298 K for the rates of chemical reactions of hydroxyl OH(v = 0) and OH (v = 1) with vibrationally excited hydrogen. These are 3.5 x 10 to the 12th power and 6.2 x 10 to the 12th power cc/mol-sec, respectively. Author

N79-26135*# Life Systems, Inc., Cleveland, Ohio.
TECHNOLOGY ADVANCEMENT OF THE ELECTROCHEMICAL CO2 CONCENTRATING PROCESS Final Report, Feb. 1975 - Mar. 1979
F. H. Schubert, D. B. Heppner, T. M. Hallick, and R. R. Woods May 1979 125 p refs
(Contract NAS2-8666)
(NASA-CR-152250; LSI-ER-258-7) Avail: NTIS HC A06/MF A01 CSCL 07D

Two multicell, liquid-cooled, advanced electrochemical depolarized carbon dioxide concentrator modules were fabricated. The cells utilized advanced, lightweight, plated anode current collectors, internal liquid cooling and lightweight cell frames. Both were designed to meet the carbon dioxide removal requirements of one-person, i.e., 1.0 kg/d (2.2 lb/d). M.M.M.

N79-26136*# Lehigh Univ., Bethlehem, Pa. Center for Surface and Coatings Research.
EVALUATION OF SURFACE PROPERTIES IN SPAR ELECTROPHORESIS Final Report
J. W. Vanderhoff and F. J. Micale Nov. 1978 24 p refs
(Contract NAS8-32657)
(NASA-CR-161248) Avail: NTIS HC A02/MF A01 CSCL 07D

Topics discussed include (1) a coating for the continuous particle electrophoresis (CPE) apparatus which will result in an

electroosmotic flow, based on theoretical calculations, that will yield the maximum resolution of separation; (2) the effect of particle concentration on the resolution of separation; and (3) the development of at least three types of well-characterized latex particles which could be used for instrument evaluation on earth and in microgravity. Electrophoretic mobility measurements of candidate particles by microcapillary electrophoresis and in the CPE are implied. A.R.H.

N79-26137# Duke Univ., Durham, N. C.
SYNTHESIS OF SILICON-NITROGEN-PHOSPHORUS COMPOUNDS INCLUDING A NEW SYNTHESIS OF PHOSPHAZENES Final Report, 1 Sep. 1977 - 31 Dec. 1978
Robert H. Neilson 26 Mar. 1979 5 p refs
(Grant DAAG20-77-G-0214)
(AD-A067274; ARO-15108.1-C) Avail: NTIS HC A02/MF A01 CSCL 07/2

This research under ARO sponsorship has been directed toward the synthesis, characterization, structural isomerization, and thermal decomposition reactions of new silicon-nitrogen-phosphorus compounds. Some of these compounds undergo smooth decomposition when heated to afford phosphazenes, oligomeric materials of general formula (NPRR')n. GRA

N79-26138# Colorado State Univ., Fort Collins. Dept. of Chemistry.
ELECTROCHEMICAL AND SPECTRAL INVESTIGATIONS OF Ni(II) ION EQUILIBRIA IN ROOM TEMPERATURE CHLOROALUMINATE SOLVENTS
R. J. Gale, B. Gilbert, and R. A. Osteryoung Apr. 1979 24 p refs
(Contract N00014-77-C-0004)
(AD-A067782; TR-10) Avail: NTIS HC A02/MF A01 CSCL 07/4

Absorption spectra have been recorded for NiCl2 dissolved in 0.8:1 and 1.5:1 molar ratio AlCl3:1-butylpyridinium chloride as a solvent at room temperature. In basic (chloride-rich) melts, the Ni(II) is present as NiCl42(-) with molar extinction coefficients A(658) = 169 and A(705) = 175 l/mol/cm. The reduction of the Ni(II) ion species at vitreous carbon electrodes exhibited irreversible behavior in acidic melts but no NiCl42(-) ion reduction was detected in the basic solvent. Potentiometry gave a theoretical 2-electron Nernst slope for Ni(II) additions in the acidic region and a fourth power Cl(-) ion dependence consistent with NiCl42(-) formation in the basic region. At 40 C, the Ni/Ni(II) standard electrode potential on the mole fraction scale was determined to be +0.8000 + or - 0.005 V (vs. 2:1 Al reference), and an equilibrium constant for the dissociation reaction, NiCl42(-) in equilibrium with Ni2(-) + 4 Cl(-) was determined to be 1.2 + or - 1.0 x 10 to the -46th power. GRA

N79-26139# Naval Research Lab., Washington, D. C.
ARIS MANUAL Interim Report
Klaus Hain 9 Apr. 1979 43 p ref
(AD-A067830; NRL-MR-3954) Avail: NTIS HC A03/MF A01 CSCL 07/4

A computer system for the automated (numerical integration) of chemical type equations has been developed. The manual describes the use of the system, its input and output, and the incorporation of the generated FORTRAN program in a user program. The developed ARIS system has the following features which are essential for the successful use of such a system: (1) It is complete which means the input to the system is sufficient to generate a complete chemistry program (including error printouts). The generated program is efficient (vectorizable) and simple to incorporate in the user program; (2) The reactions are to be given in a physical form: A + B + ... C + D + ...with reaction energies E,C, ... The programming for initiation, back substitution, rate coefficients, conversion factors and additional source terms is easy. The generated FORTRAN is comprehensible; and (3) The ARIS system provides integration schemes suited for stiff equations with special features for asymptotic behavior. Author (GRA)

N79-26140# Harry Diamond Labs., Adelphi, Md.
ENERGY LEVELS AND LINE INTENSITIES FOR THE GROUND CONFIGURATION OF Pr3+ IN LiYF4
Leon Esterowitz, Filbert J. Bartol, Roger E. Allen, Donald E. Wortman, and Clyde A. Morrison Feb. 1979 57 p refs
(DA Proj. 1L1-61102-AH-46)
(AD-A067845; HDL-TR-1875) Avail: NTIS HC A04/MF A01 CSCL 07/2

In the present work, a systematic spectroscopic investigation of trivalent praseodymium (Pr3+) in lithium yttrium fluoride (LiYF4 or YLF) was undertaken. High-resolution polarized absorption and fluorescence spectra were measured at temperatures between 10 and 300 K and analyzed to determine the energy levels of the 4f2 ground configuration. Spectroscopic data previously reported for Pr3+: YLF either have been incomplete or have led to incorrect energy assignments. Experimental line intensities for Pr3+ in YLF also were determined and are reported for the first time. The spectra were analyzed in detail to obtain empirical parameters that describe the effects of the host lattice on the Pr3+ energy levels. GRA

N79-26141# Virginia Univ., Charlottesville. Dept. of Chemistry.
TETRACARBON METALLOCARBORANES. 7: COBALT SYSTEMS DERIVED FROM (CH3)4C4B8H8. SYNTHESIS AND INTERCONVERSION OF 11-, 12-, AND 13- VERTEX NIDO CAGES
William M. Maxwell and Russell N. Grimes Apr. 1979 30 p refs
(Contract N00014-75-C-0305; NR Proj. 053-569)
(AD-A067671; TR-28) Avail: NTIS HC A03/MF A01 CSCL 07/3

A gas chromatographic/mass spectrometric (GC/MS) procedure that overcomes problems encountered when using GC procedures is described. The GC/MS procedure, which relies on selected mass scanning in restricted regions of the chromatograms, was developed because in the combustion process the distribution pattern of the individual polychlorinated byphenyls changes, rendering invalid the pattern matching approach used with the gas chromatographic/electron caputre detection method. GRA

N79-26142# California Univ., Berkeley. Lawrence Berkeley Lab.
BONDING IN INORGANIC COMPOUNDS: A STUDY BY X-RAY PHOTOELECTRON SPECTROSCOPY
Steven Charles Avanzino Oct. 1978 49 p refs
(Contract W-7405-eng-48)
(LBL-8294) Avail: NTIS HC A03/MF A01

Core electron binding energies were measured for a variety of inorganic and organometallic compounds using gas phase X-ray photoelectron spectroscopy (XPS). The atomic charge distributions in these molecules were deduced from the binding energies, often leading to a better understanding of the bonding in these compounds. The XPS spectra of fifteen volatile tin compounds were recorded. The data suggest that the metal d orbitals are not significantly involved in the bonding. The oxygen 1s XPS spectra of gaseous CH3Mn(CO)5, [Pi-C5H5Fe(CO)2]2, and Co4(CO)12 can be readily resolved into separate peaks due to bridging and terminal carbonyl groups. The C ls spectrum of Fe(CO)5 consists of a single symmetric peak. The carbonyl ligand core binding energies of transition-metal carbonyl complexes are sensitive to differences in the metal-to-CO ligand bonding. Both C ls and O ls carbonyl binding energies correlate well with average C-O stretching force constants or average C-O stretching frequencies. DOE

N79-26143# Institute of Gas Technology, Chicago, Ill.
DEVELOPMENT OF COMBUSTION DATA TO UTILIZE LOW-Btu GASES AS INDUSTRIAL PROCESS FUELS Quarterly Status Report, 1 Apr. - 30 Jun. 1978
Richard T. Waibel and Edward S. Fleming Aug. 1978 31 p
(Contract EX-76-C-01-2489; Proj. 8985)
(FE-2489-30) Avail: NTIS HC A03/MF A01

Combustion trials were completed with the fourth burner (high forward momentum) and the fifth burner (flat-flame). Experiments have begun with the sixth burner (high-excess-air). The high forward momentum burner could be operated with a stable flame using all three of the substitute fuel gases, Koppers-Totzek oxygen (KTO), Wellman-Galusha air (WGA) and Winkler air (WA). KTO performed slightly better than natural

gas in terms of thermal efficiency while WGA and WA did not perform as well as natural gas. The flat-flame burner could not be operated with a flat-flame using any of the substitute fuels. Subsequent experiments found that modifying the air inlet and downrating the burner from 3 million Btu/hr to 2 million Btu/hr could achieve a flat-flame with KTO fuel gas. Much more serious downrating would be necessary for the low Btu Wellman-Galusha air and Winkler air fuel gases on this particular burner. DOE

N79-26144# Ames Lab., Iowa.
CHARACTERIZATION OF A FABRY-PEROT INTERFEROMETER AND A dc ARC PLASMA JET FOR SPECTROCHEMICAL ANALYSIS M.S. Thesis - Iowa State Univ.
C. S. Ford Jan. 1979 55 p refs
(Contract W-7405-eng-82)
(IS-T-815) Avail: NTIS HC A04/MF A01

A system involving the use of a Fabry-Perot interferometer in combination with a dc arc plasma jet was constructed and characterized for spectrochemical analysis. Parameters such as flow rate ratio, observation region, electrode composition and orifice size were considered. Improvements such as noise reduction and dry aerosol introduction of samples were suggested. DOE

N79-26145# Colorado State Univ., Fort Collins. Dept. of Chemistry.
FORMATION AND TRANSFORMATION OF POLYCYCLIC ORGANIC MATTER FROM COAL COMBUSTION
David F. S. Natusch 1978 27 p refs
(Contract EE-77-S-02-4347)
(COO-4347-1) Avail: NTIS HC A03/MF A01

Vapor-to-particle condensation adsorption of polycyclic aromatic hydrocarbons (PAH) on fly ash and photochemical transformation of particulate polycyclic organic matter (POM) were studied. Results show that POM vapor is adsorbed on co-entrained particles as the temperature falls. Photodecomposition of PAH's is decreased substantially by adsorption onto coal fly ash particles, although certain PAH's undergo rapid oxidation in the dark when adsorbed onto fly ash. Implications of the results for assessing the environmental/health impact of POM are discussed. DOE

N79-26146# Sandia Labs., Albuquerque, N. Mex. Laser Applications and Spectroscopy Div.
SANDIA LABORATORY COMBUSTION SIMULATION FACILITY
Kennith L. Goin Jan. 1979 28 p refs
(Contract EY-76-C-04-0789)
(SAND-78-2240) Avail: NTIS HC A03/MF A01

A test facility built to stimulate the flow of high temperature combustion products, including that through the channel of a coal fired MHD power generator, is described. The facility provides widely variable and closely controlled operating conditions for use in developing techniques for analyzing flows of combustion products. It also provides an environment for studies of materials and other technological problems related to coal fired MHD power plants. Some results of limited operational experience are included. DOE

N79-26147# Oak Ridge National Lab., Tenn.
CHARACTERIZATION OF MULTIALKYLATED POLYCYCLIC AROMATIC HYDROCARBONS IN ENERGY-RELATED MATERIALS
W. H. Griest, B. A. Tomkins, J. L. Epler, and T. K. Rao 1978 26 p refs Presented at 3d Symp. on Polynucl. Aromatic Hydrocarbons, Columbus, Ohio, Oct. 1978
(Contract W-7405-eng-26)
(CONF-781039-9) Avail: NTIS HC A03/MF A01

The composition and nature of multialkylated PAHs from a coal derived crude oil were studied to indicate that in some complex matrices, the multialkylated PAHs constitute a major portion of the PAH isolate. Their overall contribution to the mutagenicity of the PAH isolate appears to be substantial. The bioactive constituents of complex energy related materials should not overlook the potential importance of this class of PAHs. DOE

N79-26148# Oak Ridge National Lab., Tenn. Health and Safety Research Div.
PRELIMINARY THOUGHTS ON PROXY PNA
R. B. Gammage 1978 17 p refs Presented at Symp. on Assessing in Ind. Hygiene Monitoring Needs for the Coal Conversion and Oil Shale Ind., Upton, N. Y., 5 Nov. 1978
(Contract W-7405-eng-26)
(CONF-781150-5) Avail: NTIS HC A02/MF A01

The possible adverse environmental impacts of polynuclear aromatic (PNA) compounds are considered. Better monitoring data for PNA compounds are needed to establish the level of worker exposure. This need, together with the inaccuracy of the method for cyclohexane soluble fraction of particulate matter (CSFTPM), and because the latter does not always correlate well with the PNA content, are the best reasons which can be advanced for measuring PNA proxy compounds. Research and development is required in each of these areas to understand more fully the behavior, both chemical and biological, of these complex PNA mixtures. Measuring techniques and instrumentation that can provide more economic and efficient monitoring of selected proxy compounds were designed. DOE

N79-26149# Princeton Univ., N. J.
COMBUSTION OPTIMIZATION STUDIES FOR STRATIFIED CHARGE AND DIESEL ENGINES Progress Report, 1 Oct. 1977 - 30 Sep. 1978
R. L. Steinberger and F. V. Bracco Aug. 1978 9 p
(Contract EY-77-S-02-4191)
(COO-4191-1) Avail: NTIS HC A02/MF A01

The objectives of the program are to assess the feasibility and operating characteristics of the following high compression, spark ignition (or self ignition), stratified charge (or diesel) engine configuration: compression ratio: 16; open chamber; direct fuel injection; unthrottled operation; 615 cc/cylinder; explored speed range 1000 to 4000 rpm (expected practical range 600 to 6000 rpm); fuels: ethanol-diesel mixtures; and spark ignition (stratified charge) or self ignition (diesel), to continue the development and the testing of physical and numerical aspects of multidimensional combustion models in order to assess and improve their accuracy and to reduce their computation time, and to contribute to the achievement of a more fundamental and detailed understanding, characterization, and command of the processes which control efficiency and emissions in internal combustion engines. DOE

N79-26150# California Univ., Livermore. Lawrence Livermore Lab.
FUEL MOTION AND POLLUTANT FORMATION IN STRATIFIED CHARGE COMBUSTION
Charles K. Westbrook Oct. 1978 45 p refs Presented at 1979 SAE Intern. Automotive Eng. Congr. and Exposition, Detroit, 26 Feb. 1979
(Contract W-7405-eng-48)
(UCRL-81155; Conf-790216-2) Avail: NTIS HC A03/MF A01

The concept of charge stratification was examined, using a numerical model for fluid mechanics and chemical kinetics. Initially homogeneous and stratified charge cases are discussed and compared. Simplified global rate expressions for the chemical reactions were compared with a detailed reaction mechanism. Results computed for the stratified models indicated that the fuel can be completely burned before it reached the walls of the combustion chamber, effectively eliminating wall quenching as a source of unburned hydrocarbon emissions. However, volume flame quenching appeared to result in unacceptably large amounts of unburned fuel in the stratified models. DOE

N79-26151# Bendix Corp., Kansas City, Mo.
TIME-TEMPERATURE CORRESPONDENCE OF THE DYNAMIC MECHANICAL PROPERTIES OF HALTHANE 73-18 AND HALTHANE 87-1
G. K. Baker Nov. 1978 27 p refs
(Contract EY-76-C-04-0613)
(BDX-613-1867-Rev) Avail: NTIS HC A03/MF A01

The time-temperature correspondence of the storage shear modulus, loss shear modulus, and loss tangent of two urethane adhesives, halthane 73-18 and halthane 87-1, were determined. Experimental determinations of the frequency dependence of the

shear moduli were made from 0.01 to 3.0 Hz at various temperatures ranging from -60 C for halthane 73-18 and -91.5 C for halthane 87-1 to 25 C for both. The WLF equation was used to determine the frequency dependence of the shear moduli and loss tangent up to frequencies of 10 PHz. DOE

N79-26152# Electricite de France, Paris. Div. Conversion Electrochimique.
THERMOPLASTIC MATERIALS: WATER ELECTROLYSIS [ELECTROLYSE DE L'EAU MATIERES THERMOPLASTIQUES]
Jean-Jacques Lecoz Jan. 1977 20 p refs In FRENCH
(P/539/77/06) Avail: NTIS HC A02/MF A01

Based on bibliographical research, a study was carried out on thermoplastic materials which can be used in electrolytic cells containing potassium hydroxide at temperatures at or above 120 C. A selection of materials is considered including polyamides, fluorinated plastics, polyoxyphenylenes, and polysulfides. Maximum working temperatures and other properties are listed.
Author (ESA)

N79-26153# Environmental Monitoring and Support Lab., Research Triangle Park, N. C. Quality Assurance Branch.
STABILITY EVALUATION OF AMBIENT CONCENTRATIONS OF SULFUR DIOXIDE, NITRIC OXIDE, AND NITROGEN DIOXIDE CONTAINED IN COMPRESSED GAS CYLINDERS
Berne I. Bennett Feb. 1979 33 p refs
(PB-292749/9; EPA-600/4-79-006) Avail: NTIS
HC A03/MF A01 CSCL 14B

Compressed gas samples of sub-part per million concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide were evaluated for long and short term stability. Except for several stainless steel tanks, the samples were contained in aluminum cylinders. A degree of stability was achieved over the short term, however, all of the samples were considered unstable over the term of the evaluations. Utilization of ambient level compressed gas samples may be considered where relative stability is required for no more than two or three months. GRA

N79-26154# Little (Arthur D.), Inc., Cambridge, Mass.
MEASUREMENT OF PCB EMISSIONS FROM COMBUSTION SOURCES Final Report, Dec. 1976 - Dec. 1978
P. L. Levins, C. E. Rechsteiner, and J. L. Stauffer Feb. 1979 90 p refs
(Contract EPA-68-02-2150)
(PB-293360/4; EPA-600/7-79-047) Avail: NTIS
HC A05/MF A01 CSCL 07D

A gas chromatographic/mass spectrometric (GC/MS) procedure that overcomes problems encountered when using GC procedures is described. The GC/MS procedure, which relies on selected mass scanning in restricted regions of the chromatograms, was developed because in the combustion process the distribution pattern of the individual polychlorinated biphenyls changes, rendering invalid the pattern matching approach used with the gas chromatographic/electron capture detection method. GRA

26 METALLIC MATERIALS

Includes physical, chemical, and mechanical properties of metals, e.g., corrosion; and metallurgy.

N79-26155 Illinois Univ. at Urbana-Champaign, Urbana.
THE PROPERTIES OF INDIUM GALLIUM ANTIMONIDE THIN FILMS DEPOSITED BY MULTITARGET rf SPUTTERING Ph.D. Thesis
Charles Edward Wickersham, Jr. 1978 363 p
Avail: Univ. Microfilms Order No. 7913651

A detailed model of the multitarget rf sputtering deposition process is described and used to predict both film composition and thickness. The MTS process has been used to deposit both multilayered films, which exhibit superlattice X-ray reflections, and homogeneous films. Homogeneous film microstructure and the film electrical and optical properties varied significantly with film composition. The InSb rich films were polycrystalline with as-deposited Hall mobilities of 100 cm square/V-sec. Isothermal and laser zone annealing of these films increased the Hall mobilities to 700 cm square/V-sec. The as-deposited GaSb-rich films were amorphous with effective Hall mobilities of 10 cm square/V-sec. Impulse stimulated explosive crystallization (ISC) was observed in the amorphous films. A model of ISC was developed in which the ISC phenomenon was described using the crystallization kinetics of amorphous materials and linear heat transfer.
Dissert. Abstr.

N79-26156 Connecticut Univ., Storrs.
THERMAL FATIGUE OF OXIDATION RESISTANT OVERLAY COATINGS FOR SUPERALLOYS Ph.D. Thesis
Thomas Edward Strangman 1978 175 p
Avail: Univ. Microfilms Order No. 7911412

Research on the problem of thermal fatigue cracking in NiCorCrAlY coating-superalloy systems is presented. Thermal-Mechanical Fatigue cycle 1, which maximizes tension in the coating at relatively low temperatures is the most severe strain-temperature cycle from a coatings standpoint. In constrast, cycle 2 conditions result in compressive strains in the coating; when testing with this cycle, coating crack initiation was either not detectable or confined to cracking of the surface oxide scale. Cycle 1 crack initiation and propagation relationships can be used to estimate thermal fatigue lives for a coating-superalloy system. At low strain ranges, the cycles required to initiate coating cracking are a fraction of the total fatigue life of a component.
Dissert. Abstr.

N79-26157 Rensselaer Polytechnic Inst., Troy, N. Y.
THE EFFECT OF ENVIRONMENTAL VARIABLES ON THE PITTING CORROSION BEHAVIOR OF SINGLE AND DUPLEX PHASE 304L STAINLESS STEEL Ph.D. Thesis
Paul Edward Manning 1978 190 p
Avail: Univ. Microfilms Order No. 7913082

Pitting potential measurements were made on single phase base metal and duplex phase weld metal by potentiostatic, potentiodynamic and scratch test methods. Several surface conditions and heat treatments were examined and the effects of chloride ion concentration, pH and temperature of the electrolyte on the pit initiation of single and duplex phase alloys were investigated. Single phase alloy pitting potentials were a strong function of the surface condition and the test method used, while the duplex phase alloy pitting potentials were independent of them. This is explained by the nature of the pit initiation sites, which are the sulfide inclusions in the case of the single phase alloy, and the residual delta ferrite/austenite interface in the duplex phase alloy. Dissert. Abstr.

N79-26158 Rensselaer Polytechnic Inst., Troy, N. Y.
AN INVESTIGATION OF DUPLEX WELD SOLIDIFICATION IN AUSTENITIC STAINLESS STEELS Ph.D. Thesis
John Carlton Lippold 1978 234 p
Avail: Univ. Microfilms Order No. 7913080

The results of Varestraint Tests indicated that weldments which contained a small amount of retained delta ferrite were more resistant to hot cracking than alloys which were either fully austenitic or consisted of an equilibrium mixture of austenite and ferrite at room temperature. No apparent correlation exists between retained ferrite and hot cracking resistance in alloys which exhibit a vermicular, duplex as welded microstructure. Microanalysis of backfilled cracks, observed along grain and subgrain boundaries in the fusion zone, indicated that the last liquid to solidify in these regions was derived from the diffusion zone in front of the moving solid-liquid interface during steady state solidification. Dissert. Abstr.

N79-26159 Carnegie-Mellon Univ., Pittsburgh, Pa.
THE EFFECTS OF MICROSTRUCTURE AND STRENGTH ON THE FRACTURE TOUGHNESS OF ULTRA-HIGH STRENGTH ALUMINUM ALLOYS Ph.D. Thesis
Gerard Michael Ludtka 1978 186 p
Avail: Univ. Microfilms Order No. 7909877

Three different ultra high purity compositions were chosen and fabricated into 1.60 mm (0.063 inches) sheet in a T6 temper providing a range of yield strengths from 496 MPa (72 ksi) to 614 MPa (89 ksi). These alloys were shown to differ only in the volume fraction of the fine matrix strengthening precipitates

as was determined by quantitative optical metallography and quantitative transmission electron microscopy. Fracture toughness data were generated using Kahn-type tear tests, edge-notched tensile tests, as well as R-curve and Jc analyses performed on data from 4-inch wide center-cracked tension panel tests. Consistent with previous studies, it was demonstrated that the toughness decreases as the yield strength is increased by increasing the solute content. Dissert. Abstr.

N79-26160 Illinois Univ. at Urbana-Champaign, Urbana.
A STUDY OF METAL-OXYGEN SOLID SOLUTIONS UTILIZING SOLID ELECTROLYTIC CELLS Ph.D. Thesis
Robert John Lauf 1978 102 p
Avail: Univ. Microfilms Order No. 7913523

Research on the thermodynamic and kinetic behavior of oxygen in a number of Group V metals and alloys is presented. Investigations were made with a ThO2/Y2O3 electrolyte over the temperature range of 600-1150 C. The activity of oxygen in three Nb-Ta alloys (nominally 25, 50, and 75 at.%Ta) was found to obey Henry's Law up to the solubility limit in each alloy. The standard entropy and enthalpy of solution of oxygen in the three Nb-Ta alloys were intermediate between those for pure niobium and pure tantalum, and varied almost linearly with Nb-Ta content. The diffusion coefficient of oxygen was measured in niobium and vanadium, and the values were in agreement with literature values obtained by a variety of techniques. The diffusion coefficient of oxygen in each of several dilute substitutional niobium alloys was measured and compared to the diffusion coefficient in pure niobium. Dissert. Abstr.

N79-26161 Rensselaer Polytechnic Inst., Troy, N. Y.
HIGH-CYCLE FATIGUE BEHAVIOR OF A COBALT-BASED EUTECTIC ALLOY Ph.D. Thesis
Charles William Koburger, III 1978 183 p
Avail: Univ. Microfilms Order No. 7913078

Extensive fatigue investigation was performed on the baseline alloy at 25 and 825 C, temperatures below and above the point where TaC fiber fragmentation causes specimen failure, as verified by tensile tests. Some additional investigation was performed at 675 and 1000 C. Atmosphere has some effect on 25 C fatigue resistance, with a large gain in 10 to the 7th power cycle fatigue limit, but little gain in life at higher stresses. At 825 C atmosphere has little effect other than to reduce usable sample load bearing area by oxidation. Low temperature prestressing to above the TaC fracture stress has no effect on fatigue limit at 25 C, with some reduction in life at moderate stresses. At high temperature, the prestressing leads to severe reduction in cyclic properties. Increasing the solidification rate four fold decreases the interfiber spacing by half. Dissert. Abstr.

N79-26162 Stanford Univ., Calif.
DIFFUSIVITY AND SOLUBILITY OF NITROGEN IN MULTICOMPONENT LIQUID IRON ALLOYS CONTAINING ALLOYING ELEMENTS UP TO 50 wt% AT 1600 C Ph.D. Thesis
Arumugham Jayarajan 1979 296 p
Avail: Univ. Microfilms Order No. 7912376

The diffusion coefficient of nitrogen (D sub N), the activity coefficient (f sub N) and thereby the solubility of nitrogen (S sub N), in highly concentrated complex liquid iron alloys containing up to 50 wt % of alloying elements have all been predicted successfully by new modified Taylor series expansion methods. The experimental data available on D sub N and f sub N in binary iron alloys at 1600 C were correlated to obtain mathematical equations. For D sub N this was achieved by using a model based on absolute rate theory for diffusion of a dilute third component in a mixture of two solvents and for f sub N by expressing the molar excess Gibbs free energy of a ternary solution as a power series in molefractions of nitrogen, iron, and alloying element X. These equations are used to calculate the first and second order terms in the equations for predicting D sub N and f sub N in the complex alloys. Dissert. Abstr.

N79-26163 Pennsylvania State Univ., University Park.
THE ROLE OF MOLD ATMOSPHERES IN THE PENETRATION OF MOLTEN STEEL INTO SAND MOLDS Ph.D. Thesis
Jawahar Lal Gaindhar 1978 224 p
Avail: Univ. Microfilms Order No. 7909069

A comprehensive model was developed which explains how a thin iron-oxide film is responsible for causing metal penetration; how the growth and strength of film, with its subsequent decay and eventual rupture, result in a depth of penetration which is proportional to the thickness of the oxide film. The reversal of the nature of the mold atmosphere from oxidizing to reducing is a necessary condition for metal penetration to take place. The model was used to analyze and confirm results of gas chromatography, temperature, X-ray diffraction analysis, and electron microprobe analysis. The positional sensitivity of the test casting, leading to a hotter volume in the tooth-space and the subsequent enhancement of the likelihood of occurrence of metal penetration, was most satisfactorily explained by the oxide film model. Thus the test gear casting design has a firm footing and assures a reproducible test. Dissert. Abstr.

N79-26164 Colorado School of Mines, Golden.
THE EFFECT OF MANGANESE AND NICKEL ADDITIONS IN THE WELDING FLUX ON THE FUSION ZONE OF PEARLITIC DUCTILE IRON Ph.D. Thesis
Alfredo Manuel DavilaMarquez 1978 239 p
Avail: Univ. Microfilms Order No. 7912214

Compositional modification of the austenitic phase field was used to develop and optimize new austenitic filler materials for welding ductile iron. Filler materials, based on both manganese and nickel additions to the weld pool, were used to demonstrate that high quality ductile iron weldments can be achieved with a reduction in cracking susceptibility and improved machinability when compared to presently used high nickel filler materials. Also with these new filler metal compositions of lower melting temperatures, a reduction in heat input of the welding process can be utilized to assist in alleviating the continuous carbide formation in the partial melted region of the heat affected zone which is responsible for the fusion line cracking. Coefficients of thermal expansion, microstructural consituents, hardness, machinability, and width of the heat affected zone are all reported as a function of filler metal composition. Dissert. Abstr.

N79-26165 California Univ., Los Angeles.
HIGH TEMPERATURE DEFORMATION OF SOLID SOLUTION STRENGTHENED SUPERALLOYS Ph.D. Thesis
Pankaj Agarwal 1979 143 p
Avail: Univ. Microfilms Order No. 7913706

Axisymmetric compression tests were conducted in the temperature range of 1030 to 1205 C and at strain rates between 10 to the -3 power to 1 sec/1 using specimens of nickel-base Hastelloy alloy C-276 and cobalt-base Haynes alloy No. 188. The relationship between the deformation parameters (flow stress, strain, strain rate and temperature), the rate controlling mechanism, and the operative softening and hardening processes taking place during the high temperature deformation of these two superalloys are discussed. Optical microscopic examination of the deformed and rapidly water quenched specimens revealed the structure ranging from heavily deformed and elongated original grains to fully dynamically recrystallized equiaxed grains, and mixtures thereof depending on the deformation temperature and strain rate. Dissert. Abstr.

N79-26166 Carnegie-Mellon Univ., Pittsburgh, Pa.
STRUCTURE OF [001] GRAIN BOUNDARIES IN BICRYSTALLINE THIN FILMS OF GOLD Ph.D. Thesis
Frederic Cosandey 1978 124 p
Avail: Univ. Microfilms Order No. 7911925

High resolution transmission electron microscopy was used to examine bicrystalline thin films of gold which were obtained directly by vapor deposition and subsequent epitaxial growth on [001] bicrystalline substrates of NaCl. The effect of electron bombardment of NaCl substrates on epitaxial growth of gold films was also investigated. Results indicate that anion surface vacancies are created during low-energy electron bombardment. These, in turn, promote nucleation and subsequent epitaxial growth of vapor-deposited films. Preferred inclinations, corresponding to the (110) symmetric plane observed in low and high-angle boundaries are discussed as well as the dislocation structure in [001] tilt low-angle and sigma = 13 coincidence boundaries. Dissert. Abstr.

N79-26167 Colorado School of Mines, Golden.
STABILIZATION OF THE PLUTONIUM DELTA PHASE IN THE PLUTONIUM-GALLIUM-ZIRCONIUM TERNARY PHASE EQUILIBRIA SYSTEM Ph.D. Thesis
Frank Thomas Zurey 1977 215 p
Avail: Univ. Microfilms Order No. 7912237

A total of twenty alloys were prepared from a composition matrix consisting nominally of 0, 3, 8, and 20-at% zirconium and 0, 0.1, 0.6, 1.4, 3, 5, and 8.5-at% gallium. The alloys were homogenized at 425 C for 200 hours. The treatments used to promote the decomposition of the delta phase were: (1) an anneal of 200 hours at 225 C and/or 400 hours at 260 C, (2) 90% reduction by rolling at 225 C followed by a 200 hour anneal at 225 C, (3) isostatic compression to 165 C and 650 MPa for 30 minutes, (4) isostatic compression followed by 200 hours at 225 C, and (5) thermal cycling between +100 C and -85 C. The status of the decomposition of the delta phase was monitored by X-ray diffraction analysis and by density measurement. Samples representative of each alloy produced and of each identified phase were studied metallographically.
Dissert. Abstr.

N79-26168 Minnesota Univ., Minneapolis.
MORPHOLOGY AND SINTERING OF PLATINUM, PALLADIUM, RHODIUM AND PLATINUM-ALLOYS ON SiO2 AND GRAPHITE Ph.D. Thesis
Mao-Min Chen 1978 127 p
Avail: Univ. Microfilms Order No. 7911985

Effects of O2, N2, H2O, Cl2 and H2 atmospheres on sintering mechanisms and rates, morphology, structure and chemical composition of small Pt, Pd, Rh and Pt-alloy crystallites on SiO2 and graphite were studied by scanning transmission electron microscopy with energy dispersive X-ray microanalysis following heat treatment in flowing gases at 1 atm or by controlled atmosphere electron microscopy. An initial Pt film of 10 to 20 A thick on SiO2 produced crystallites of 20 to 2000 A diameter when heated to 400 to 700 C. The average crystallite size was larger by a factor of up to two in air than in N2, and H2O in both gases significantly inhibited particle growth. No crystallite migration was observed in any gases at any temperature. Atomic diffusion is therefore the exclusive sintering mechanism. The sintering mechanism is also governed by atom diffusion although the growth of crystallites is slower for alloys than for pure Pt metal.
Dissert. Abstr.

N79-26169 Florida Univ., Gainesville.
DIFFUSION STUDY IN THE Fe-Co-Ni-Au SYSTEM USING THE PENETRATION TENDENCY APPROACH Ph.D. Thesis
Fernando Cosme Rizzo Assuncao 1978 216 p
Avail: Univ. Microfilms Order No. 7913248

Aspects of the diffusion behavior of the four components were interpreted using the penetration tendency viewpoint. An algorithm for treating diffusion in semi-infinite two phase couples displaying a planar interface was presented, yielding some qualitative insights into the role of the location and width of the two phase field in determining the motion of the interface. Analysis of the pattern of Kirkendall shifts in binary, ternary, and quaternary couples of the system Fe-Ni-Co-Au produced a ranking of penetration tendencies for the elements in the decreasing order Fe, Au, Co, Ni. A new technique for the determination of multiphase ternary isotherms using binary two phase couples was used to obtain the phase boundaries of the AuCo two phase field in the ternary systems Au-Ni-Co and Au-Fe-Co. The description of the technique has been incorporated in the present study.
Dissert. Abstr.

N79-26170 Illinois Univ. at Urbana-Champaign.
A STUDY OF THE EXPERIMENTAL IMPLEMENTATION AND THE RESULTING CHARACTERISTIC BEHAVIOR OF THE J-INTEGRAL FRACTURE TOUGHNESS PARAMETER APPLIED TO TWO CONTROLLED-ROLLED STEELS Ph.D. Thesis
Kenneth Wayne Carlson 1978 147 p
Avail: Univ. Microfilms Order No. 7913403

With a standard J-integral test technique and procedure still under development by the ASTM, various alternative procedures are studied to assess their effectiveness. A suitable procedure for obtaining a critical J-integral value (J sub c) is presented. The inter-relationship between the J sub c value and specimen dimensions is investigated. In the course of the investigation, the correspondence between the J-integral and crack opening displacement is demonstrated. Finally, the maximum load point on a load-deflection record is assessed as a J-integral measurement point. Since maximum load is demonstrated to be unsuitable as a toughness measurement point, but may still be of interest for design purposes, the factors which influence the maximum load are studied.
Dissert. Abstr.

N79-26171 Stanford Univ., Calif.
THERMODYNAMIC AND KINETIC INVESTIGATIONS OF LIQUID METAL-OXYGEN SYSTEMS USING SOLID STATE ELECTROCHEMICAL METHODS Ph.D. Thesis
SooKap Hahn 1979 210 p
Avail: Univ. Microfilms Order No. 7912367

Solid state electrochemical techniques were used to investigate the high temperature thermodynamic and kinetic properties of some metal-oxygen and metal-metal alloy systems. Three solid oxide electrolytes, yttria stabilized zirconia, calcia stabilized zirconia, and yttria doped thoria were used in these studies. The systems studied were Ga-O, In-O, Ga-In-O, Bi-O, Sb-O, Sb-Bi-O and Sb-Bi alloys. Properties studied were the activity of Sb in the Sb-Bi liquid alloy systems, solubility, S(O), and activity, a(O), of oxygen in the respective liquid metals, Gibbs energies of formation of some metal oxides, and the diffusivity of oxygen, D(O), in liquid metals and alloy systems. These properties are important for the understanding of the interaction between oxygen and liquid metals.
Dissert. Abstr.

N79-26172# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
THE KINETICS OF THE OXIDATION OF GRAPHITE BY AN IMPINGING JET OF GAS
Shoji Taniguchi, Atsuchi Kikuchi, and Siro Maeda 1979 28 p refs Transl. into ENGLISH from Tetsu-to-Hagane (Japan), v. 63, no. 7, Jun. 1977 p 1071-1080
(NRC/CNR-TT-1938; ISSN-0077-5606) Avail: NTIS HC A03/MF A01

The characteristics of gas phase mass transfer occuring in a reactor utilized for reactions between molten iron agitated by high frequency induction and an impinging jet of gas were investigated. Experiments were carried out in which graphite was oxidized in a CO2-CO gas mixture at reaction temperatures ranging from 1000 C to 1500 C. At 1500 C, the rate of oxidation is controlled by mass transfer in the gas phase. An empirical equation correlating to Sh numbers was obtained. An equation for the rate of reaction at 1000 to 1300 C was developed and an activation energy of 43.8 kcal/mol was obtained for the forward reaction. The overall rate of oxidation was calculated and the values found were consistent with experimental values. Sh values calculated from published data on the rate of decarburization of a CO2-molten steel system could be expressed fairly well when the concentration of carbon in the steel was high.
A.R.H.

N79-26173# Canada Inst. for Scientific and Technical Information, Ottawa (Ontario).
SOLUBILITY OF OXYGEN IN PURE IRON FROM THE MELTING POINT TO 2046 DEG C DETERMINED USING THE LEVITATION MELTING METHOD
Wilhelm Anton Fischer and Juergen Fritz Schumacher 1979 14 p refs Transl. into ENGLISH fro... Arch. Eisenhuettenwes. (West Germany), v. 49, no. 9, 1978 p 431-435
(NRC/CNR-TT-1942; ISSN-0077-5606) Avail: NTIS HC A02/MF A01

The temperature dependence of the solubility of oxygen in iron from the melting point to above 2000 C was determined with the aid of the crucible-free levitation melting method. Schematics of the levitation melting installation and of the levitation coil used are presented. Values reported by others and obtained either in the crucible by way of equilibrium studies over the range from the melting point of iron to 1810 C, or by the levitation method with the range between 1785 C and 1960 C are tabulated and compared with experimental results. With the exception of the values reported in one study, all other oxygen contents are within the scatter band established.
A.R.H.

N79-26174# Royal Aircraft Establishment, Farnborough (England).
STRESS CORROSION CRACKING OF HIGH STRENGTH Al-Zn-Mg-Cu ALLOYS: MATRIX PRECIPITATION
C. J. Peel, D. Clark, P. Poole, and R. A. Farrar 1978 47 p refs
(RAE-TR-78110; BR66515) Avail: NTIS HC A03/MF A01

Precipitation in the matrices of Al-5.6% Zn-2.5% Mg and Al-5.6% Zn-2.5% Mg-1.6% Cu alloys was studied to determine the effects of copper addition and the T73 treatment. Corrosion potentials, measured in 5.3% NaCl-1.3% H2O2 as a function of aging time and temperature, indicated that the matrix precipitation contained copper in the quaternary alloy, particularly during the second stage of the T73 treatment. Two series of 5g castings were prepared, with compositions MgZn sub x Cu sub y and MgZn sub x Cu sub y Al sub y, to represent eta phase containing magnesium, zinc, copper and aluminum and the structures of the castings were determined. A systematic change in lattice parameters with increasing copper content was observed in these alloys and this was used to identify the composition of the eta phase in the quaternary alloy as, typically, MgZn sub 1.8 Cu sub 0.1 Al sub 0.1. It is concluded that the presence of copper suppresses the formation of T' in favor of eta and stabilizes the eta phase and this results in only a small loss in strength during the second stage of T73 aging applied to the quaternary alloy compared with a relatively large strength reduction in the case of the ternary alloy. A.R.H.

N79-26175*# Battelle Columbus Labs., Ohio. Metalworking Section.
COMPUTER-AIDED ANALYSIS AND DESIGN OF THE SHAPE ROLLING PROCESS FOR PRODUCING TURBINE ENGINE AIRFOILS Interim Topical Report, 1 Oct. 1976 - 31 Dec. 1977
G. D. Lahoti, N. Akgerman, and T. Altan Mar. 1978 65 p refs
(Contract NAS3-20380)
(NASA-CR-135367) Avail: NTIS HC A04/MF A01 CSCL 11F

Mild steel (AISI 1018) was selected as model cold-rolling material and Ti-6Al-4V and INCONEL 718 were selected as typical hot-rolling and cold-rolling alloys, respectively. The flow stress and workability of these alloys were characterized and friction factor at the roll/workpiece interface was determined at their respective working conditions by conducting ring tests. Computer-aided mathematical models for predicting metal flow and stresses, and for simulating the shape-rolling process were developed. These models utilize the upper-bound and the slab methods of analysis, and are capable of predicting the lateral spread, roll-separating force, roll torque and local stresses, strains and strain rates. This computer-aided design (CAD) system is also capable of simulating the actual rolling process and thereby designing roll-pass schedule in rolling of an airfoil or similar shape. The predictions from the CAD system were verified with respect to cold rolling of mild steel plates. The system is being applied to cold and hot isothermal rolling of an airfoil shape, and will be verified with respect to laboratory experiments under controlled conditions. Author

N79-26176# Rockwell International Corp., El Segundo, Calif.
FRACTURE TOUGHNESS IN TITANIUM ALLOYS Final Engineering Report, 1 May 1976 - 31 Dec. 1977
G. R. Keller, J. C. Chesnutt, F. H. Froes, and C. G. Rhodes 31 Dec. 1978 119 p refs
(Contract N00019-76-C-0427)
(AD-A067785; NA-78-917) Avail: NTIS HC A06/MF A01 CSCL 11/6

Over the past decade, a concentrated effort has been made by both producers and aerospace users of titanium alloys to develop alloys for future aircraft applications. This effort has been motivated to a large extent by the advent of new design criteria and concepts such as fracture mechanics and design-to-cost. Ti-6Al-4V, the workhorse of titanium alloys in aircraft structures, is being pushed to its technological limits to satisfy these criteria and, in some instances, is falling short of meeting imposed requirements. A new titanium alloy, CORONA-5A, has been developed specifically to meet the needs of aircraft applications designed to fracture mechanics criteria. This report presents results of a program aimed at demonstrating the feasibility of producing CORONA-5 on a production scale, evaluating its strength versus toughness characteristics over a wide range of producible strength levels, and making it available to investigators other than the developing agencies for their independent evaluation of its properties. In addition, results are presented herein of detailed material characterizations of selected forgings produced under a previous development contract (Reference 3). GRA

N79-26177# Rockwell International Corp., El Segundo, Calif.
LOWER COST BY SUBSTITUTING STEEL FOR TITANIUM Final Report, Aug. 1975 - Oct. 1978
D. E. Parker, G. V. Bennett, and R. P. Robelloto Nov. 1978 444 p refs
(Contract F33615-75-C-3109)
(AD-A067997; RI/LAD/NA/78-415; AFFDL-TR-78-186) Avail: NTIS HC A19/MF A01 CSCL 11/6

This program was part of an overall program to develop a high-strength steel, designated AF1410, which compares favorably with titanium in strength/weight efficiency and fatigue characteristics and yet can be produced at a significant reduction in cost. The Rockwell portion of the overall program consisted of selecting existing candidate designs, developing steel substitute designs, and comparing their estimated cost with their titanium counterparts. It also consisted of development of heat-treat processes, to optimize machinability, and of a comprehensive materials test program. Finally, the program included the machining of a full-scale test article from a forging provided by the Air Force from another portion of the program, and the fatigue, damage tolerance, and static residual strength testing of the full-scale article. In addition, validation of the production cost reduction was a prime objective. During testing, cracks developed which were subsequently analyzed as being the result of excessive deflections. An in-test repair was accomplished, and the testing was successfully completed. Author (GRA)

N79-26178# Argonne National Lab., Ill.
GAS BUBBLE AND DAMAGE MICROSTRUCTURE IN HELIUM IMPLANTED NICKEL
M. Kaminsky, S. K. Das, and G. Fenske 1978 14 p refs Presented at the 9th Symp. on the Phys. of Ionized Gases, Dubrovnik, Yugoslavia, 28 Aug. - 2 Sep. 1978
(Contract W-31-109-eng-38)
(CONF-780851-4) Avail: NTIS HC A02/MF A01

Transmission electron microscopy was used to study the depth distribution of bubbles (or voids) and dislocation damage in nickel irradiated at 500 C with 20 and 500 keV He-4(+) ions to total doses ranging from 2.9 x 10 to the 15th power to 5 x 10 to the 17th power ions/sq cm. The size, number density, and volume fraction of bubbles (or voids) were measured from micrographs taken from samples sectioned parallel to the surface normal. The results for 500 keV irradiation show that the peaks in the depth distribution of number density and of volume fraction (i.e., swelling) of bubbles (or voids) are 20 percent deeper than the calculated projected range distribution. However, for 20 keV irradiation, the peak in the swelling occurs at a depth which is about a factor of two larger than the peak in the distributions of projected range and the energy deposited into damage as calculated according to Brice. The peak positions are nearly independent of the total doses used in these studies. The implications of these results for the blistering mechanisms are discussed. DOE

N79-26179# Oak Ridge National Lab., Tenn.
SOLIDIFICATION BEHAVIOR OF TYPE 308 STAINLESS STEEL FILLER METAL
S. A. David and G. M Goodwin Jan. 1979 16 p refs
(Contract W-7405-eng-26)
(ORNL-TM-6644) Avail: NTIS HC A02/MF A01

A series of experiments that combined thermal analysis and interrupted solidification was carried out to understand the solidification behavior of type 308 stainless steel weld metal. Results indicate the following sequences of phase separations for the alloy investigated: L yields L + delta yields L + delta + gamma yields gamma + delta. Ferrite observed at room temperature was identified as the untransformed primary delta - ferrite that formed during the initial stages of solidification. The model of freezing and the extent of solid-state diffusion both

control the amount and distribution of ferrite. Microstructural and microprobe analyses indicate both extensive solid-state transformation and solute redistribution during solidification and cooling from the nonequilibrium solidus to room temperature. DOE

N79-26180# Brookhaven National Lab., Upton, N. Y.
EFFECT OF FISSION PRODUCT INTERACTIONS ON THE CORROSION AND MECHANICAL PROPERTIES OF HTGR ALLOYS
S. Aronson (Brooklyn Coll., N. Y.), J. G. Y. Chow, P. Soo, and M. Friedlander 1978 8 p refs Presented at the 2d US-Jap. Seminar on HTGR Safety Technol., Fuji, Japan, 24 Nov. 1978
(Contract EY-76-C-02-0016)
(BNL-NUREG-25325; Conf-781144-16) Avail: NTIS HC A02/MF A01

Preliminary experiments were carried out to determine how fission product interactions may influence the mechanical integrity of reference HTGR structural metals. Type 304 stainless steel, Incoloy 800 and Hastelloy X were heated to 550 to 650 C in the presence of CsI. It was found that no corrosion of the alloys occurred unless air or oxygen was also present. A mechanism for the observed behavior is proposed. A description is also given of some long term exposures of HTGR materials to more prototypic, low concentrations of I2, Te2 and CsI in the presence of low partial pressures of O2. These samples are scheduled for mechanical bend tests after exposure to determine the degree of embrittlement. DOE

N79-26181# California Inst. of Tech., Pasadena. Engineering Materials Lab.
METASTABLE SUPERCONDUCTING ALLOYS
W. L. Johnson Jul. 1978 42 p refs
(Contract EY-76-C-03-0822)
(CALT-822-104) Avail: NTIS HC A03/MF A01

A review of experimental results and a survey of current work on superconducting materials is presented. The systematics of superconductivity in noncrystalline metals and alloys are described along with an analysis of the microscopic parameters which underlie the observed trends. The unique properties of these superconductors which arise from the high degree of structural disorder in the amorphous state are emphasized. DOE

N79-26182# Oak Ridge National Lab., Tenn. Metals and Ceramics Div.
OXYGEN PARTIAL PRESSURE: A KEY TO ALLOYING AND DISCOVERY IN METAL OXIDE-METAL EUTECTIC SYSTEMS
J. D. Holder, G. W. Clark, and B. F. Oliver (Tenn. Univ., Knoxville) 1978 6 p refs Presented at In-situ Conf. Mater. Res. Soc., Boston, 29 Nov. 1978
(Contract W-7405-eng-26)
(CONF-781172-1) Avail: NTIS HC A02/MF A01

Control of oxygen partial pressure is essential in the directional solidification of oxide metal eutectic composites by techniques involving gas-solid and gas-liquid interactions. The existence of end components in the eutectic composite is Po2 sensitive as are melt stoichiometry, solid phase compositions, and vapor losses due to oxidation-volatilization. Simple criteria are postulated which can aid the experimentalist in selecting the proper gas mixture for oxide metal eutectic composite growth. DOE

N79-26183# Sandia Labs., Livermore, Calif.
HYDROGEN COMPATIBILITY OF STRUCTURAL MATERIALS FOR ENERGY STORAGE AND TRANSMISSION Annual Report, 1 Oct. 1977 - 30 Sep. 1978
W. R. Hoover, ed., S. L. Robinson, J. R. Spingarn, and R. E. Stoltz 15 Nov. 1978 74 p refs
(Contract EY-76-C-04-0789)
(SAND-79-8200) Avail: NTIS HC A04/MF A01

The major goal of this research program is the generation of the data necessary to assess the feasibility of transporting gaseous hydrogen through our existing natural gas pipeline network. Pipe segments with moderately sized flaws were exposed to flowing, 1000 psig hydrogen for six months with no failures. Similar flaws evaluated by burst tests displayed at 15% decreased in burst strength when hydrogen is present. Microstructure, typical of those found in pipeline weldments, were not found to be significantly embrittled by 1000 psig hydrogen when the degree of embrittlement was assessed by tensile testing. Laboratory tests show low to moderate embrittlement of the parent metal when tensile tested in 1 atm hydrogen. However, the fracture toughness of this parent metal was found to drop by 40% when the same low pressure hydrogen environment is used. DOE

N79-26184# Brookhaven National Lab., Upton, N. Y.
DEGRADATION MECHANISM OF Nb3Sn COMPOSITE WIRES UNDER TENSILE STRAIN AT 4.2 K
T. Luhman, M. Suenaga, D. O. Welch, and K. Kaiho Sep. 1978 13 p refs Presented at Applied Superconductivity Conf., Pittsburgh, Pa., 25 Sep. 1978
(Contract EY-76-C-02-0016)
(BNL-24957; Conf-780952-32) Avail: NTIS HC A02/MF A01

Bronze-processed Nb3Sn composite wire conductors exhibit changes in their superconducting parameters when strained in tension. The effect of strain on critical current and an analysis by optical and SEM techniques of crack formation in the Nb3Sn layer under strain was studied. The effect of strain history on both reversible and irreversible changes in critical current and the roles of differential thermal contraction induced residual strains and of Nb3Sn cracking are discussed. DOE

N79-26185# General Atomic Co., San Diego, Calif.
ANGULAR EFFECTS IN THE SPUTTERING OF STAINLESS STEEL BY HYDROGEN IONS
Joe N. Smith, Jr. Sep. 1978 7 p refs Presented at the 5th Conf. on the Use of Small Accelerators, Denton, Tex., 6-8 Nov. 1978
(Contract EY-76-C-03-0167; Proj. 3235)
(GA-A-15124; Conf-781113-2) Avail: NTIS HC A02/MF A01

One major source of plasma contamination in Tokamaks results from sputtering of the first wall of the plasma chamber by hydrogenic species. Laboratory experiments are reported in which the angular and energy distribution Cr(+) sputtered from 304 stainless steel by H3(+) is measured as a function of angle of incidence of the H3(+) beam. A change in both the angular distribution and the energy distribution is observed toward grazing incidence, which is taken as evidence of the increasing contribution of surface recoils. The effects of surface contamination on the yield, angular distribution, and energy distribution of sputtered ions are also reported. DOE

N79-26186# Bendix Corp., Kansas City, Mo.
DEPOSITION OF ALUMINUM-COPPER ALLOY ON LAMINATED POLYIMIDE SUBSTRATES FROM AN RF INDUCTION SOURCE
G. J. Hale Nov. 1978 46 p refs
(Contract EY-76-C-04-0613)
(BDX-613-1993-Rev) Avail: NTIS HC A03/MF A01

A physical vapor deposition process with an RF induction vapor source was developed to deposit 11.2 micron aluminum-copper alloy on polyimide laminate substrates. The total thickness values can be repeated within a + or - 0.5 micron range with a 90-percent yield. The average thickness uniformity (standard deviation divided by average thickness) of the deposit acquired by beta backscatter for 100 substrates was 1.2 percent. The aluminum-0.3 weight percent copper vapor charge resulted in a copper content in the deposit of approximately 0.12 weight percent. The copper showed no preferential deposition pattern, as related to the surface of the laminate and its dispersion throughout the deposit. DOE

N79-26187# Technische Hogeschool, Delft (Netherlands). Dept. of Aerospace Engineering.
THE ROLE OF ENVIRONMENT, FREQUENCY AND WAVE SHAPE DURING FATIGUE CRACK GROWTH IN ALUMINUM ALLOYS
C. Q. Bowles May 1978 176 p refs
(VTH-LR-270) Avail: NTIS HC A09/MF A01

An experimental technique for producing plastic castings of fatigue cracks by a process of vacuum infiltration is described. Study of crack advance in air for alloys 2024-T3 and 7075-T6 shows a brittle advance with the crack tip subsequently blunting to an elliptic geometry at maximum load. Crack advance test

results made in vacuum are discussed. The role of water vapor was investigated with a computer controlled, closed loop servo-hydraulic fatigue machine. Conclusions are reached regarding the role of hydrogen diffusion, the absence of striations in dry air fractures in certain conditions and the possible importance of hold periods in the load cycles. Author (ESA)

N79-26188# Electricite de France, Chatou. Dept. Etude des Materiaux.

EVOLUTION OF THE PROPERTIES AND STRUCTURE OF 17Cr-13Ni-Mo VERY LOW CARBON AUSTENITIC STAINLESS STEEL DURING HIGH TEMPERATURE EXPOSURE

R. Boudot, L. Valibus, J. N. Calvet (CEA, Saclay, France), and P. Petrequin (CEA, Saclay, France) 10 Nov. 1977 27 p refs Presented at 'Journees Metal. d'Automne', Paris, 18-20 Oct. 1977

Avail: NTIS HC A03/MF A01

Two samples of 17Cr-13Ni-Mo very low carbon steel of 15 and 70mm thickness, respectively, were studied using tensile and Charpy U impact tests. Intercrystalline corrosion following periods from 10 to 30,000 hours at temperatures ranging from 400 to 900 C was observed. In service evolution of this type of austentic stainless steel is defined relative to the development of liquid metal fast breeder reactors. The two plates show similar behavior. A slight hardening and loss of ductility, increasing with temperature and length of treatment, was verified. Intercrystalline corrosion tests made after extended aging reveal ranges of sensitivity. The application of a stress, although slight, during aging lead to a shift in this sensitivity range toward shorter periods. Extrapolation shows that after 200,000 hrs at 550 C the impact energy should remain at 50% - 60% of the initial value. Structural study and electron scanning results are discussed. Author (ESA)

N79-26189# Electricite de France, Paris. Div. Conversion Electrochimique.

OXYGEN OVERVOLTAGE ON NICKEL AND THE 50-50 Ni-Fe ALLOY IN 40% KOH AT 80 C. ROLE OF OXIDE FILMS [SURTENSIONS D'OXYGENE SUR LE NICKEL ET L'ALLIAGE Ni-Fe 50-50 DANS KOH 40% A 80 C. ROLE DES FILMS D'OXYDE]

Jean-Marie Gras, Michel Pernot, and Christian Durococq Mar. 1978 18 p refs In FRENCH

(P/539/77/13) Avail: NTIS HC A02/MF A01

Oxygen separation from nickel as well as from the binary 50-50 Ni-Fe alloy was studied in order to determine the role of oxides. For nickel, a high purity level results in a low anodic yield. Among Ni-Fe alloys there is an optimal Ni/Fe ratio with good resistance to corrosion and high electrocatalytic activity. If the element alloyed to nickel is not dissolved by anodic attack the anodic activity of nickel is enhanced by the formation of an oxide complex Ni(x)Fe(y)O(z)K(t). The layers of oxide analyzed by secondary ionic emission includes two sub-layers where the M-O and M-M bonds are of different classes. Author (ESA)

N79-26190# Electricite de France, Paris. Div. Conversion Electrochimique.

NICKEL PLATING, VOLUME 2 [LES DEPOTS DE NICKEL, TOME 2]

Alain Damien Jul. 1977 69 p refs In FRENCH

(P/539/77/28) Avail: NTIS HC A04/MF A01

A bibliographical review of literature on nickel platings and nickel coatings is presented. The prospects for using Kanigen nickel plating in water electrolysis are discussed. The Kanigen process, unlike that of electrolytic nickel coating, allows for the plating of contorted surfaces. It is concluded that the Kanigen process makes possible acceptable nickel plating of contorted surfaces if some precautions are taken. The cost is higher than for electrolytic plating and handling is more difficult.

Author (ESA)

N79-26191# Electricite de France, Paris. Div. Conversion Electrochimique.

CORROSION OF NICKEL DEPOSITS IN 40% KOH AT 180 C, PART 1 [CORROSION DES DEPOTS DE NICKEL DANS KOH 40% A 180 C, RAPPORT 1]

Jean-Marie Gras and Noel Lacoudre Sep. 1977 62 p refs In FRENCH

(P/539/77/31) Avail: NTIS HC A04/MF A01

Corrosion resistance of nickel coatings was evaluated in order to determine their behavior relative to electrochemical reactions. Coatings having slight possibility showed good corrosion resistance, oxidizing medium, a nickel oxide isolant layer appeared. When oxygen was lacking corrosion was more severe. The 650 C reheating had a negative effect on the resistance to the corrosion of Kanigen coatings. No nickel coating was found a priori ineffective as a result of operating conditions met with in these experiments. Author (ESA)

N79-26192# Electricite de France, Paris. Div. Conversion Electrochimique.

Fe-Cr-Ni STAINLESS STEEL CORROSION IN 40% KOH AT 150 C AND 180 C, PART 2 [CORROSION DES ACIERS INOXYDABLES Fe-Cr-Ni DANS KOH 40% AT 150 C ET 180 C. RAPPORT NO 2]

Jean-Marie Gras, Noel Lacoudre, and Didier Jouatte Dec. 1977 85 p refs In FRENCH

(P/539/77/38) Avail: NTIS HC A05/MF A01

Commercial stainless steels are not suited to alkaline electrolytic cells working at 150 C. The ferritic and austeno-ferritic steels are not susceptible to stress corrosion, but in an oxidating medium are extensively corroded. Among the austenitic alloys, the types 25-25 without molybdenum are free of crack corrosion. Results show that a high concentration of carbon in the weld bead favors intergranular corrosion. Conclusions regarding the role of alloy constituents and prospectives for future work are discussed. Author (ESA)

N79-26193# Royal Aircraft Establishment, Farnborough (England).

THE EFFECT OF GRAIN STRUCTURE ON THE STRESS CORROSION RESISTANCE OF Al-Zn-Mg-Cu ALLOYS

C. J. Peel and P. Poole Apr. 1978 35 p refs

(RAE-TR-78034; BR63423) Avail: NTIS HC A03/MF A01

The stress corrosion resistance, fracture toughness, and tensile properties of three alloys were determined so as to identify the effects of the grain refining elements Zr, Cr, Fe, and Mn on these properties. Additionally, a special processing treatment for producing an extensively recrystallized structure with a small grain size, was compared to the coarser structures of the conventionally worked alloys. Results indicate that alloys containing Fe, Cr, and Mn have the highest stress corrosion resistance and strength, but the lowest fracture toughness. The addition of 0.15% Zr to the quaternary alloy slightly improves the tensile strength and stress corrosion resistance, but has no effect on fracture toughness. However this addition of Zr markedly improves the hot workability of the alloy and increases its tensile ductility. Special processing and working at 250 C was beneficial to the stress corrosion resistance of the quaternary alloy, but detrimental to alloys containing Zr or Fe, Cr, and Mn.

Author (ESA)

N79-26194# Unilever Research, Vlaardingen (Netherlands).

REDUCTION OF SILICA SUPPORTED NICKEL CATALYSTS

J. W. E. Coenen 1978 21 p refs Presented at Conf. on Sci. Bases for the Prepn. of Heterogeneous Catalysis, Louvain-la-Neuve, Belg., 4-7 Sep., 1978

Avail: NTIS HC A02/MF A01

The difficult reducibility of silica supported nickel catalysts was studied. A structural model for these catalysts made by precipitation was evolved. Nickel silicate is seen as a glue layer between the silica and nickelhydroxide which forms an epitaxial overlay on the silicate. A strong inhibition of the reduction by water vapor was also found. Arguments are put forward for the assumption that in the reduction the nucleation is rate controlling. It is possible to explain the rate behavior in a reasonably quantitative way. Author (ESA)

N79-26195# Defence Research Information Centre, Orpington (England).

NO MORE CADMIUM PLATING? ARE THERE PROCESSES TO REPLACE IT?

P. Baeyens Nov. 1978 13 p refs Transl. into ENGLISH from Galvanotechnik v. 68, no. 7, 1977 p 590-597

(DRIC-Trans-5462; BR66721) Avail: NTIS HC A02/MF A01

The future of cadmium plating is considered in light of the toxicity of cadmium and the environmental health hazards created by its use in increased quantities. The use of cadmium in electronics and as a corrosion protective coating for steel are discussed. Possible alternatives such as zinc and tin plating are examined. Author (ESA)

N79-26196# Admiralty Underwater Weapons Establishment, Portland (England).
MICROSTRUCTURAL CHARACTERIZATION OF CAST NICKEL ALUMINUM BRONZE
E. A. Culpan and G. Rose Jun. 1978 35 p refs
(AUWE-TN-580/78; BR65483) Avail: NTIS HC A03/MF A01

The morphology and chemical analysis of the complex phases present in cast nickel aluminum bronze of nominal composition 10% aluminum, 5% nickel, and 5% iron were investigated using optical microscopy, scanning electron microscopy, and scanning transmission electron microscopy coupled to an energy dispersive analysis system. Optical and electron microscopy techniques are successful in identifying and analyzing the microstructural phases in cast nickel aluminum bronze, namely alpha, beta, and four kappa phases. The microstructural changes that occur during heat treatment lead to the precipitation of a further kappa phase which differs in morphology and chemical composition to those present in as-cast structures. It is suggested that these results can be used to explain the varied properties of strength and corrosion behavior of cast nickel aluminum bronze. Author (ESA)

N79-26197# National Physical Lab., Teddington (England). Div. of Chemical Standards.
THE DETERMINATION OF THE ALLOYING CONSTITUENTS OF HIGH SPEED TOOL STEELS BY X-RAY EMISSION SPECTROSCOPY
Joyce M. Griffiths Nov. 1978 30 p refs
(NPL-Chem-94) Avail: NTIS HC A03/MF A01

The analysis of tool steels by X-ray fluorescence presents a more difficult problem than was met with in work on nickel-base alloys and mild, low alloy, and stainless steels. The use of correction factors based on theoretical data gave results scarcely different from those obtained with the NPL equation. Results show that for nickel, manganese, tungsten, cobalt, molybdenum, and silicon steels agreement with values derived by chemical analysis is quite good. For chromium and vanadium the agreement is not so good but would easily permit the identification of the type of tool steel. Author (ESA)

N79-26198# Battelle Columbus Labs., Ohio.
CRITICAL EXPERIMENTS, MEASUREMENTS AND ANALYSES TO ESTABLISH A CRACK ARREST METHODOLOGY FOR NUCLEAR PRESSURE VESSEL STEELS Quarterly Progress Report, Apr. 1978 - Jun. 1978
G. T. Hahn, P. C. Gehlen, A. J. Markworth, R. G. Hoagland, C. W. Marschall, M. F. Kanninen, A. R. Rosenfield, and C. Popelar Feb. 1979 90 p refs
(Contract AT(49-24)-0293)
(PB-292777/0; BMI-2018; NUREG-CR-0652) Avail: NTIS HC A05/MF A01 CSCL 18J

Results of a program seeking (1) dynamic analyses of crack arrest in thermally stressed nuclear pressure vessels, (2) standardization of a laboratory test method for measuring crack arrest toughness, and (3) a crack arrest toughness data base for unirradiated and irradiated nuclear steels and weldments are described. GRA

N79-26199# Kawasaki Steel Corp., Tokyo (Japan). Technical Development Dept.
HEAVY PLATE OF QUENCHED AND TEMPERED STEEL WITH 80kg/mm2 TENSILE STRENGTH
Tokushi Funakoshi, Tohoru Yasuda, Shin-ichi Aoki, Jun-ichiro Tsuboi, and Katsuro Inomata Nov. 1978 15 p refs
(PB-292929/7; Kawasaki-Steel-TB-6) Avail: NTIS HC A02/MF A01 CSCL 11F

Quenched and tempered high tensile strength steel plates with large thickness are used for civil engineering structures such as long span bridges, penstocks, and industrial machines. Good weldability, high notch toughness, and homogeneous mechanical properties in the thickness direction are required for these plates. Fundamental experiments, manufacturing process, and the mechanical properties of HT-80 heavy plates for Osaka Harbor Bridge in Japan are described. GRA

N79-26200# Bureau of Mines, Reno, Nev. Metallurgy Research Center.
CATALYTIC PROPERTIES OF NATURAL AND RARE-EARTH-PROMOTED MANGANESE NODULES
E. F. Ferrell 1979 13 p refs
(PB-293267/1; BM-RI-8330) Avail: NTIS HC A02/MF A01 CSCL 07D

The Bureau of Mines, U.S. Department of the Interior, studied the used of manganese sea nodules for catalytic oxidation in air of 1 pct carbon monoxide, 1 pct propane, and 1 pct methane. Catalysts were prepared from both Pacific Ocean and Atlantic Ocean modules and compared with a platinum catalyst using a fixed-bed, steady-state microreactor with gas chromatographic analysis. Combustion temperatures with manganese modules were 50 to 100 C lower than those with the platinum catalyst. Ion-exchange addition of rare-earth promoters to the nodule catalyst decreased combustion temperatures an additional 5 to 45 C. GRA

27 NONMETALLIC MATERIALS

Includes physical, chemical, and mechanical properties of plastics, elastomers, lubricants, polymers, textiles, adhesives, and ceramic materials.

N79-26201 Connecticut Univ., Storrs.
PHOTODEGRADATION AND BIODEGRADATION OF SOME POLYMERS CONTAINING CARBONYL GROUPS Ph.D. Thesis
Catherine Anne Byrne 1978 149 p
Avail: Univ. Microfilms Order No. 7913004

The biodegradability of polyamines, prepared from piperazine, 4,4'-trimethylenedipiperidine and N,N'-dimethyl-1,3-propanediamine, and of polyesters prepared from adipic, suberic, azelaic, sebacic and 1,10-decanedicarboxylic acids was studied using two fungi, Aspergillus niger and Aspergillus flavus. Polyesters from diacids of eight carbons or more were degraded by Aspergillus niger. Polyesters of sebacic acid were degraded by Aspergillus flavus and by the enzyme elastase. The polyamines were photodegradable, but the polyesters were crosslinked by ultraviolet light. There was no difference in biodegradability before and after photolysis. The polysebacamides were photoreactive, but those derived from piperazine and 2-hydroxy-1,3-propanediamine were crosslinked by light. Some of these polymers were more biodegradable after photolysis.
Dissert. Abstr.

N79-26202 Massachusetts Univ., Amherst.
SCATTERING STUDIES FROM POLYMER BLENDS Ph.D. Thesis
Thomas Paul Russell 1979 475 p
Avail: Univ. Microfilms Order No. 7912709

Small angle X-ray scattering studies utilizing a step scanning Kratky apparatus were performed on polyvinylchloride (PVC)/poly (epsilon-caprolactone) (PCL) blends over the entire composition range above the melting point of the PCL, as well as on the blends crystallized at 30 C. Results on the semicrystalline blend indicate that the lamellae separate to accommodate the PVC forming a true compatible mixture in the interlamellar regions. Studies on the amorphous blends indicate that the two polymers are segmentally mixed and, consequently, form a true solution.
Dissert. Abstr.

N79-26203 Catholic Univ. of America, Washington, D. C.
ANALYTIC MODELS FOR THE TREATMENT OF ALTERNANT LINEAR HETEROPOLYMERS Ph.D. Thesis
Joseph Parker 1979 111 p
Avail: Univ. Microfilms Order No. 7913364

Two methods for the analysis of alternant linear polymeric molecules, exemplified by linear arrays in charge transfer crystals, were studied. In the first method, a Huckel molecular orbital treatment, analytic solutions for the orbitals and their energies were obtained using the theory of cyclic groups and boundary

conditions appropriate to a linear system. The second analytic model made use of statistical mechanical techniques to give a quantitative measure of the average bonding conditions along the alternant chain for given chain lengths and temperatures. Ensemble number average calculations indicated evidence of cooperative transition effects for certain bonding energy values, i.e. donor-acceptor types, and at low temperatures for the benzine-iodine complex. Dissert. Abstr.

N79-26204 Illinois Inst. of Tech., Chicago.
CHARACTERIZATION AND EFFECTS OF MOLECULAR ORIENTATION IN AMORPHOUS POLYMERS Ph.D. Thesis
Abdul Hameed Bhombal 1978 133 p
Avail: Univ. Microfilms Order No. 7913088

Samples of amorphous polystyrene having different amounts and types of orientation are studied. These samples are characterized by measuring their birefringence and by orientation distribution functions. There is not a unique relationship between average orientation, as characterized by birefringence, and the tensile strength of the oriented polymer. Instead, the ultimate mechanical properties of the oriented network, as characterized by its tensile strength, depend not only on the average orientation but also on which portion of the relaxation spectrum is preferentially oriented. Dissert. Abstr.

N79-26205 Massachusetts Univ., Amherst.
FLAME RETARDATION OF POLYMERS Ph.D. Thesis
Joseph Kai-Yuen Kiang 1979 237 p
Avail: Univ. Microfilms Order No. 7912692

The central purpose of the study was to understand the chemical events that may be occurring in the decomposition of a polymer and how a potential flame retardant would in general suppress, alter or modify certain chemical reactions. Chromyl chloride(CrO_2Cl_2) was used to react with semi-crystalline isotactic polypropylene in an Etard reaction under different experimental conditions. The chromium-containing polypropylene and the neat polypropylene were investigated for their thermal stabilities and ignition characteristics by thermogravimetric analysis and differential thermal analysis. The relative flammabilities of these polymers were studied by the limiting oxygen index test. A novel interfaced pyrolysis gas chromatographic peak identification system was used to pyrolyze the polymers in inert and in oxidative atmospheres. Similar experiments were performed on polyisoprene and vanadium-containing polyisoprene. Dissert. Abstr.

N79-26206 Massachusetts Univ., Amherst.
THE PREPARATION AND CHARACTERIZATION OF ELASTOMERS CONTAINING PENDENT SULFONIC ACID DERIVATIVES Ph.D. Thesis
Bahram Siadat 1979 327 p
Avail: Univ. Microfilms Order No. 7912717

Sulfonate containing rubbers were prepared by reaction of a sulfonating agent on a rubber, and direct copolymerization of diene monomers with suitable unsaturated sulfonate comonomers. Sulfonated ethylene-propylene-diene terpolymer elastomer (EPDM) was prepared by the former method, while the latter technique was employed in preparation of copolymers of isoprene and styrenesulfonic acid derivatives. Metal salts of sulfonated rubbers had properties that were consistent with those of ionomers. Dissert. Abstr.

N79-26207 Rensselaer Polytechnic Inst., Troy, N. Y.
LIGHT SCATTERING FROM PHASE SEPARATED GLASS Ph.D. Thesis
John Peter Kerwawycz 1978 206 p
Avail: Univ. Microfilms Order No. 7913076

The light scattering from phase separated glass has the peculiar characteristic of a scattered intensity profile that increases with increasing scattering angle, as measured relative to the incident beam direction. Physical origins proposed as an explanation have included diffusion zone, internal stress and interparticle interference. A detailed investigation of the light scattering from a sodium silicate and a borosilicate glass is described. Using X-ray small-angle scattering data and transmission electron micrographs as supporting evidence, it was concluded that the source of scattering in these glasses was interparticle interference. The interparticle scattering predicted from two existing X-ray scattering models is shown to be inappropriate in describing the light scattering. Dissert. Abstr.

N79-26208 Princeton Univ., N. J.
MELT ELASTICITY STUDIES: RECOVERABLE STRAIN AND RECOVERABLE STRAIN RATE OF POLYMER MELTS Ph.D. Thesis
My Nhu Nguyen 1979 105 p
Avail: Univ. Microfilms Order No. 7913995

An apparatus, developed to study the elastic properties of polymers in the melt state was employed to measure the recoverable strain of polymer melts as a function of time. Strain recovery at very short times and long times were recorded by a simple photographic technique. In addition to the strain recovery measurement, the instrument provided the stress vs. strain data and the stress relaxation data. Therefore, the modulus of elasticity, the stress overshoot and the steady state stress associated with viscosity could be determined from the stress vs. strain curve. These properties were investigated for a series of polystyrenes and polyethylenes of various molecular weights. The swelling of the melt extrudate upon exiting from an extrusion die is related to the recoverable strain rate; as the recoverable strain increases the extrudate swell increases, the greater the rate of strain recovery the more rapid the extrudate swell. Dissert. Abstr.

N79-26209*# IIT Research Inst., Chicago, Ill.
EVALUATION OF THE EFFECTS OF SOLAR RADIATION ON GLASS Final Report
R. F. Firestone and Y. Harada 31 Jan. 1979 55 p refs
(Contract NAS8-32521)
(NASA-CR-161247; D6139) Avail: NTIS HC A04/MF A01 CSCL 07C

The degradation of glass used on space structures due to electromagnetic and particulate radiation in a space environment was evaluated. The space environment was defined and a simulated space exposure apparatus was constructed. Four optical materials were exposed to simulated solar and particulate radiation in a space environment. Sapphire and fused silica experienced little change in transmittance, while optical crown glass and ultra low expansion glass darkened appreciably. Specimen selection and preparation, exposure conditions, and the effect of simulated exposure are discussed. A selective bibliography of the effect of radiation on glass is included. A.R.H.

N79-26210# Alabama Univ., University. Dept. of Chemistry.
SYNTHESIS OF POLYESTERS CONTAINING TETRATHIAFULVALENE GROUPS IN THE BACKBONE Interim Report
Charles U. Pittman, Jr., Yeon-Fong Liang, and Mitsuru Ueda 5 Mar. 1979 23 p refs Submitted for publication
(Contract N00014-75-C-0689; NR Proj. 356-561)
(AD-A066972; TR-23(ONR)) Avail: NTIS HC A02/MF A01 CSCL 11/9

Studies of highly conducting organic charge-transfer (CT) complexes have attracted enormous recent interest with the development of pseudo-one-dimensional organic metals. In particular, molecular CT complexes of either tetrathiafulvalenes (TTF) or tetraselenafulvalenes (TSeF), with tetracyanoquinodimethane (TCNQ) have been most intensively investigated owing to their quasi-metallic conductivity. The preparation of TTF and TSeF derivatives have been reviewed and new synthetic procedures for preparing unsymmetrical TTF derivatives continue to appear regularly. However, there exists a clear need for such conductors with improved material properties and three dimensional conductivity. One approach to this problem is to prepare multidimensional networks or polymers. Author (GRA)

N79-26211# Research Triangle Inst., Research Triangle Park, N. C.
DETERMINATION OF CROSSLINKING IN HIGH T SUB g POLYMERS Interim Report, 15 Oct. 1977 - 15 Oct. 1978
A. Schindler and N. Morosoff Jan. 1979 88 p refs
(Contract F33615-77-C-5195)
(AD-A067185; AFML-TR-78-186) Avail: NTIS HC A05/MF A01 CSCL 11/9

Small angle x-ray scattering (SAXS) and (WAXS) techniques are being developed to investigate and characterize cured epoxy resin inhomogeneities on the one hand and to elucidate the spatial distribution of crosslinks on the other. Priority was given

to the first problems, i.e., network inhomogeneities. Samples of cured epoxy resin have been formulated in series that would be expected to follow trends in size of highly cross-linked clusters according to results and theories in the literature. Examination of two such series of samples by SAXS shows that the expected trends are followed and that the differing sizes of clusters do cause clearly discernible changes in the SAXS pattern. However, the need for SAXS data at higher resolution is clearly indicated to allow complete interpretation. Such data is now being obtained. The proposed preparation of cured epoxy resins in which heavy atoms would be present only at cross-links is described. Progress in the synthesis of the required heavy atom reagents is reported. Author (GRA)

N79-26212# Rockwell International Corp., Anaheim, Calif. Electronic Devices Div.

SOLVENT REMOVABLE COATINGS FOR CONTAMINANT PROTECTION OF MICROCIRCUITS Final Technical Report, 1 Jun. 1977 - 30 Aug. 1978

B. L. Weigand, J. J. Licari, and L. R. Schulz Nov. 1978 134 p refs

(Contract F33615-77-C-5141; AF Proj. 2423)

(AD-A067745; C78-972/501; AFML-TR-78-144) Avail: NTIS HC A07/MF A01 CSCL 09/5

The objective of this program was to develop and evaluate low molecular weight silicon and halocarbon polymers which are solvent removable for application to hybrid microcircuits for contaminant protection. Three experimental silicon waxes and four halocarbon waxes were selected for evaluation. The materials were chemically, thermally and electrically characterized. The stressing effects of these coatings on one-mil gold wire bonded to aluminized silicon die were determined by thermal cycling from minus 65 C to plus 150 C. Half of the wire bond samples were subsequently tested for moisture resistance per MIL-STD- 883A, Method 1004.1, without bias. GRA

N79-26213# Naval Research Lab., Washington, D. C.

THE NRL PROGRAM ON ELECTROACTIVE POLYMERS Annual Report, 1 Oct. 1977 - 30 Sep. 1978

Luther B. Lockhart, Jr. 30 Mar. 1979 180 p refs

(RR0130243)

(AD-A067736; NRL-MR-3960; AR-1) Avail: NTIS HC A09/MF A01 CSCL 07/3

The general objective of this program is to develop new classes of polymeric materials that have unique and useful electrical properties suitable for application to Naval devices and systems. A subsidiary objective is to develop theory and guidelines relating electrical properties to the molecular nature and morphology of polymeric materials to permit the design of such materials with predictable properties for use in Naval applications. Specific material objectives are to synthesize, characterize, and evaluate for Naval applications: (a) polymers that have substantially inorganic main-chains that exhibit metallic or semiconductivity; (b) polyconjugated and organometallic polymers that exhibit metallic or semiconductivity; (c) organic polymers capable of forming inter- or intra-molecular charge-transfer complexes through electron donor and acceptor moities within or attached to the polymer chain; and (d) polymers that exhibit piezoelectric, pyroelectric, photovoltaic, or memory-switching properties. Specific items addressed in this first year's effort are the application of advanced analytical techniques to develop an understanding of the composition and structure of state-of-the-art polymeric conductors and superconductors, the development of computer models of electron mobility in polymeric structures which would provide guidance to the synthetic effort, and the synthesis of polyacetylenes, conjugated polyphthalocyanines and charge-transfer polymers for development of a better understanding of structure-property relationships in these sytems. Author (GRA)

N79-26214# Vanderbilt Univ., Nashville, Tenn. Dept. of Electrical Engineering.

MICROWAVE CURING OF EPOXY RESINS Final Report

L. K. Wilson and J. P. Salerno Sep. 1978 112 p refs

(Contract DAAG46-76-C-0035)

(AD-A067732; USAAVRADCOM-TR-78-46; AMMRC-TR-78-43) Avail: NTIS HC A06/MF A01 CSCL 11/9

This work is an investigation of the mechanisms responsible for the microwave heating behavior of epoxies as applied to the cure of fiberglass/Epoxy laminate structures. The problem is approached by the derivation of a mathematical relation for the rate of microwave heating in terms of electric field and material dependent parameters. The dielectric constant and loss tangent of gelled epoxy samples are measured and reported as functions of frequency and temperature. This information is used to develop a theoretical model for the microwave heating behavior of an epoxy during cure. The results of actual high power heating experiments are compared with the theoretical predictions. Physical mechanisms responsible for the observed behavior are proposed. GRA

N79-26215# Brookhaven National Lab., Upton, N. Y. Progress Sciences Div.

DEVELOPMENT OF A GLASS POLYMER COMPOSITE SEWER PIPE FROM WASTE GLASS Progress Report, Apr. - Jun. 1978

L. E. Kukacka, J. Fontana, R. Rayfiel (Teledyne Natl., Wayne, N. J.), G. Arnold, and B Galen 1978 17 p refs

(Contract EY-76-C-02-0016)

(BNL-50886; PR-8) Avail: NTIS HC A02/MF A01

The first test results on durability of glass polymer composite pipe in flowing water at 65 C are available: after exposure for 836 hr, this pipe showed no reduction in strength. The test data from vitrified clay pipe showed a great deal of scatter and no apparent trend. Asbestos cement pipe has exhibited strength regression with time, the loss being 25% after exposure for 1512 hr. Testing in 5% H_2SO_4 is in progress, but data are available only for asbestos cement pipe. The rate of deterioration was greater than in hot water, the reduction being 35.5% after 1009 hr. Experiments to optimize the GPC mix formulation are continuing. A resin concentration of 9 wt % produces specimens with adequate strength, but difficulty in meeting the hydrostatic test requirement was encountered. Recent work indicated that this can be corrected by use of a resin concentration of approximately 10.2 wt % in conjunction with improved vibration during placement. DOE

N79-26216# Ministry of Defence, London (England). Directorate of Research Materials.

THE EFFECT OF WEATHERING ON THE MODULUS OF RUPTURE OF VHR2A AND VHR3A GLASS (GLAVERBEL-MECANIVER SA)

N. S. Corney Defense Res. Inform. Centre Sep. 1978 10 p ref

(Contract KS/1/0648/C.B.43(a)2)

(DR-Mat-210; BR66315) Avail: NTIS HC A02/MF A01

Additional results are provided to those given earlier on the evaluation of thin, high-strength glass for aerospace applications. There appears to be no detrimental effect on the modulus of rupture of specimens of VHR2A and VHR3A glass after they were exposed either completely or partially for periods of up to four years on the roof of the BGIRA building in Sheffield. Author (ESA)

N79-26217# Unilever Research, Vlaardingen (Netherlands).

ELLIPSOMETRY AS A TOOL TO STUDY THE ADSORPTION BEHAVIOR OF SYNTHETIC AND BIOPOLYMERS AT THE AIR-WATER INTERFACE

J. A. deFeijter, J. Benjamins, and J. A. Veer 1978 30 p refs Revised

Avail: NTIS HC A03/MF A01

The application of ellipsometry to the study of the adsorption behavior of proteins and synthetic macromolecules at the air-water interface was investigated. Results show that for macromolecules the amount adsorbed per unit area, gamma, as determined by ellipsometry, has only a well-defined physical meaning if the refractive index increment remains constant up to the high concentrations present in the adsorbed layer. The ellipsometric technique was used to investigate the adsoprtion from solution of kappa-cassein, bovine serum albumin, and polyvinyl alcohol. The ellipsometric gamma-values of the proteins agree satisfactorily with those obtained by two independent techniques (a spreading technique and a radiotracer method). These values agree with a close-packed monolayer of side-on adsorbed molecules. The technique provides interesting information on conformational changes in adsorbed macromole-

cules, on the rate of the process, and on the conditions under which these occur. Author (ESA)

N79-26218# Royal Aircraft Establishment, Farnborough (England). Materials Quality Assurance Directorate.
THE TEARING OF WEATHERED RUBBER-COATED FABRICS
J. E. Swallow and A. R. Wakefield 10 Jan. 1978 27 p refs (RAE-TR-78005; MQAD-R-264; BR62469) Avail: NTIS HC A03/MF A01

The wing-rip tear strengths of a nylon and of a cotton fabric, each coated with natural rubber, neoprene, polyurethane or chlorosulphonated polyethylene and exposed to various weathering conditions were determined. Results show that the coated nylon fabrics have higher tear strengths than the cotton ones, but are more variable. Polyurethane-coated nylon increases in tear strength on exposure at two Australian sites, but natural rubber coated cotton decreases on exposure in the UK. Load during exposure reduces the tear strengths of natural rubber coated fabrics. Author (ESA)

N79-26219# National Physical Lab., Teddington (England). Div. of Chemical Standards.
THE RESISTANCE OF CERAMICS TO CHEMICAL ATTACK
L. A. Lay Jan. 1979 37 p refs
(NPL-Chem-96) Avail: NTIS HC A03/MF A01

An account of the resistance of engineering ceramics to chemical attack by acids, alkalis, gases, fused salts, metals, and metal oxides is given and is intended as a guide to engineers and designers in choosing materials. Comparative tables giving results from the literature are included and some of the factors which influence attack are discussed. Some tests done at NPL are described. How the use of melting diagrams can give some guidance on the likelihood of reaction is shown. Author (ESA)

N79-26220# Research Triangle Inst., Research Triangle Park, N. C.
A STUDY OF AN ELECTRODELESS GLOW DISCHARGE AS A MEANS OF MODIFYING THE SURFACE OF POLYMERS Annual Report, 1 Dec. 1977 - 30 Nov. 1978
N. Morosoff, H. Yasuda, and B. Hill Feb. 1979 41 p refs
(Contract N01-HV-3-2913)
(PB-293570/8; NIH-N01-HV-3-2913-6) Avail: NTIS HC A03/MF A01 CSCL 11I

The variations in chemical nature of plasma polymers to be found as a function of location and the ratio of power to flow rate (W/FM) are demonstrated for a series of siloxane monomers in two different reactors. It is demonstrated that by judicious selection of location, power and flow rate, identical polymer can be deposited in both reactors using a given monomer. Plasma polymer of tetramethyldisiloxane is deposited inside polyvinyl chloride tubing. The amount of material introduced into water flowing through such tubing in a flex test (peristaltic pump) is reduced in such a coated tubing as compared to the uncoated control. GRA

28 PROPELLANTS AND FUELS

Includes rocket propellants, igniters, and oxidizers, storage and handling; and aircraft fuels.

For related information see also *07 Aircraft Propulsion and Power*, *20 Spacecraft Propulsion and Power*, and *44 Energy Production and Conversion*.

N79-26221*# General Electric Co., Evendale, Ohio.
EXPERIMENTAL CLEAN COMBUSTOR PROGRAM: DIESEL NO. 2 FUEL ADDENDUM, PHASE 3 Final Report
C. C. Gleason and D. W. Bahr May 1979 66 p refs
(Contract NAS3-19736)
(NASA-CR-135413; R79AEG367) Avail: NTIS HC A04/MF A01 CSCL 21D

A CF6-50 engine equipped with an advanced, low emission, double annular combustor was operated 4.8 hours with No. 2 diesel fuel. Fourteen steady-state operating conditions ranging from idle to full power were investigated. Engine/combustor performance and exhaust emissions were obtained and compared to JF-5 fueled test results. With one exception, fuel effects were very small and in agreement with previously obtained combustor test rig results. At high power operating condition, the two fuels produced virtually the same peak metal temperatures and exhaust emission levels. At low power operating conditions, where only the pilot stage was fueled, smoke levels tended to be significantly higher with No. 2 diesel fuel. Additional development of this combustor concept is needed in the areas of exit temperature distribution, engine fuel control, and exhaust emission levels before it can be considered for production engine use. J.A.M.

N79-26222# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
LABORATORY STUDY OF PYROLYSIS OF EXPLOSIVE CONTAMINATED WASTE Final Report
J. A. Knight, L. W. Elston, and R. Scola Feb. 1979 39 p refs
(Contract DAAK10-78-C-0153)
(AD-A066973; AD-E400292; ARLCD-CR-78027) Avail: NTIS HC A03/MF A01 CSCL 13/2

Army ammunition plants dispose of large quantities of neat explosives and chemical and explosive contaminated waste by either open air burning or incineration. These disposal techniques do not take advantage of the potential fuel value (7000 BTU/lb (15.7 MJ/kg)) of these wastes. This laboratory study was conducted to investigate the feasibility of utilizing a pyrolytic process to convert explosive contaminated waste into a useable, storable fuel. The study consisted of a series of laboratory scale pyrolysis runs on explosive contaminated waste. The data points for the runs were 0, 0.5, 1, and 2% explosive contamination by weight. The results of the study indicate that AAP waste can be safely processed with no adverse environmental impact, to produce a storable fuel having a heat content of 14,000 BTU/lb (31.3 MJ/kg) with an energy conversion efficiency of approximately 70%. Author (GRA)

N79-26223# Army Armament Research and Development Command, Dover, N. J. Large Caliber Weapon Systems Lab.
THE CHARACTERIZATION OF A SLURRY EXPLOSIVE: TELEDET
Louis Avrami and Henry J. Jackson Feb. 1979 59 p refs
(AD-A066942; AD-E400295; ARLCD-TR-78077) Avail: NTIS HC A04/MF A01 CSCL 19/1

A series of safety and performance tests were conducted on the slurry explosive Teledet. This and additional data generated by other agencies have been compiled to characterize this slurry explosive as a potential candidate for military use. Comparisons were made relative to safety, performance and cost with other explosive materials. The most favorable features of Teledet are its good safety characteristics, good chemical and thermal stability (for a slurry explosive), easy emplacement, and the ability to propagate in small diameters. The features that may detract are the metal acceleration capability which is about 75% that of TNT, the separation of ingredients in low-viscosity Teledet, the inherent limitations with any slurry explosive, and the higher cost, relative to other slurry explosives. Author (GRA)

N79-26224# Air Force Aero Propulsion Lab., Wright-Patterson AFB, Ohio.
FUEL HYDROGEN CONTENT AS AN INDICATOR OF RADIATIVE HEAT TRANSFER IN AN AIRCRAFT GAS TURBINE COMBUSTOR Final Report, Jun. - Nov. 1976
Thomas A. Jackson and W. S. Blazowski Feb. 1979 24 p refs Presented at the Am. Soc. of Mech. Engr. Winter Ann. Meeting, Atlanta, 27 Nov. - 2 Dec. 1977
(AD-A067709; AFAPL-TR-79-2014) Avail: NTIS HC A02/MF A01 CSCL 21/4

Eleven fuels representing a wide range of hydrogen content were studied using a T56 single can combustor rig. Test fuels included single and double ring aromatic types as well as paraffins blended with each other and with JP-4. Fuel mixtures with hydrogen contents ranging from 9.9 to 15.9 per cent by weight were examined. The combustor inlet conditions simulated the discharge from both low and high pressure ratio gas turbine compressors operating at the cruise condition. Thermocouple data from the T56 liner are correlated wth fuel hydrogen content using a new, nondimensional combustor liner temperature

parameter. Least-squares mathematical treatment of the data resulted in an excellent second order correlation between the nondimensional temperature parameter and fuel hydrogen content and a simplified radiation analysis is presented which also explains the resulting empirical trends. Author (GRA)

N79-26225# Army Construction Engineering Research Lab., Champaign, Ill.
THERMOGRAVIMETRIC ANALYSIS OF SOLID REFUSE-DERIVED FUELS AND COAL
S. A. Hathaway and J. S. Lin Mar. 1979 28 p refs
(DA Proj. 4A7-61102-AT-23)
(AD-A067829; CERL-TR-E-149) Avail: NTIS HC A03/MF A01 CSCL 21/4

The ignition and combustion rates of three types of densified refuse-derived fuel (DRDF) and low-volatile Illinois bituminous coal were investigated at temperatures ranging from 600 C to 1000 C and residence times ranging up to 120 sec. It was found that DRDF ignition time is up to 12 times less than that of coal, that the temperature required for coal ignition at a given residence time is greater than that needed for DRDF ignition, and that the DRDF:coal time to ignition ratio is expressible as a linear function of furnace temperature. It was also found that DRDF produced from mixed municipal-residential solid waste has a slower combustion rate than that produced from homogeneous heavy paper stock, and that the combustion rates of all types of DRDF are significantly greater than that of the coal tested at a 99.9 percent level of confidence. Author (GRA)

N79-26226# Fluor Engineers and Constructors, Inc., Irvine, Calif.
COAL LIQUEFACTION TEST CENTER Quarterly Technical Progress Report, Jan. - Mar. 1978
Sep. 1978 75 p
(Contract EX-76-C-01-1517)
(FE-1517-67) Avail: NTIS HC A04/MF A01

The attempt to bring the plant on stream in an integrated mode is described. DOE

N79-26227# Atlantic Research Corp., Alexandria, Va. Research and Technology Div.
EROSIVE BURNING OF COMPOSITE SOLID PROPELLANTS: EXPERIMENTAL AND MODELING STUDIES
Merrill K. King Aug. 1978 14 p refs
(Contracts F49620-78-C-0016; F44620-76-C-0023)
(AD-A067849; AFOSR-79-0435TR) Avail: NTIS HC A02/MF A01 CSCL 21/9

An experimental apparatus designed for measurement of erosive burning rates at crossflow velocities up to Mach 1 has been used to determine the erosive burning characteristics of seven propellant formulations with systematically varied properties. A composite propellant erosive burning model based on the bending of columnar diffusion flames gives reasonably good agreement with the measured erosive burning data over a wide range of conditions, breaking down only in regions where the fuel-oxidizer gas stream mixing does not control burning rate. Propellant base (no-crossflow) burning rate is found to have a predominant effect on sensitivity to crossflow (higher-burning-rate formulations being considerably less sensitive) whether the base burning rate differences are produced by oxidizer particle size variation, oxidizer/fuel ratio variation, or use of catalysts. Comparison of erosive burning predictions using the erosive burning model described herein with flow profiles expected to prevail in the test apparatus to predictions using profiles believed to exist in cylindrically-perforated motor grains indicate that erosive burning may be considerably less for a given mainstream crossflow velocity in such a motor than in the typical erosive burning test apparatus, a result quite important to extrapolation of test apparatus erosive burning data to actual motor conditions.
Author (GRA)

N79-26228# Federal Energy Regulatory Commission, Washington, D. C. Technical Advisory Task Force.
NATIONAL GAS SURVEY: SYNTHESIZED GASEOUS HYDROCARBON FUELS
Jun. 1978 307 p refs
(DOE/FERC-0008) Avail: NTIS HC A14/MF A01

Coal hydrocarbon liquids, oil shales, tar sands, and bioconvertible materials were considered as potential feedstocks for gaseous fuels. Current status of process technology for each feedstock was reviewed, economic evaluations including sensitivity analysis were made, and constraints for establishment of a synthesized gaseous hydrocarbon fuels industry were considered. Process technology is presently available to manufacture gaseous hydrocarbon fuels from each of the feedstocks. In the economic evaluations presented, the most significant factor for liquid feedstock plants was the anticipated cost of feedstock and fuel. The economic viability of plants using other feedstocks was primarily dependent upon capital requirements. DOE

N79-26229# Public Service Electric and Gas Co., Newark, N. J.
BLENDING OF HYDROGEN IN NATURAL GAS DISTRIBUTION SYSTEMS. VOLUME 3: GAS BLENDS LEAKAGE TESTS OF SELECTED DISTRIBUTION SYSTEM COMPONENTS Final Report, 1 Jun. 1976 - 30 Apr. 1978
May 1978 66 p
(Contract EY-76-C-02-2925)
(CONS/2925-3) Avail: NTIS HC A04/MF A01

Twenty sample test joints, consisting of eleven cast-iron, cement, and jute joints, five steel joints, and four plastic joints, were tested using straight natural gas, varying blends of hydrogen with natural gas, and varying humidity levels of the gas mixture. Test results show: (1) cast-iron joints and steel joints that did not leak with natural gas did not leak with blends of up to 40% hydrogen in natural gas; (2) cast-iron joints and steel joints that had small leaks with natural gas did not leak at a higher rate with blends of up to 40% hydrogen in natural gas; (3) cast-iron joints that had large leaks with natural gas showed a detectable increase in leakage as the hydrogen level in the gas blend increased; (4) efforts to determine if the permeability of polyethylene tubing increases with increasing concentrations of hydrogen in natural gas, and with aging of the plastic, were inconclusive; and (5) there was no preferential leakage of hydrogen in any of the joints tested using blends with up to 40% hydrogen in natural gas. DOE

N79-26230# Woods Hole Oceanographic Institution, Mass.
FUELS FROM SOLAR ENERGY: PHOTOSYNTHETIC SYSTEMS: STATE OF THE ART AND POTENTIAL FOR ENERGY PRODUCTION
Joel C. Goldman 1978 124 p refs
(Contract EG-77-S-02-4151)
(COO-4151-2) Avail: NTIS HC A06/MF A01

Research on the mass culturing of microalgae has been carried out over the past 30 years in many parts of the world. Photosynthetic yields over 30 gr dry wt/sq m/day were attained on occasion in many locations for short periods and yields between 15 to 25 gr dry wt/sq m/day for longer periods are now common. This apparent upper limit in productivity is not coincidental. Under outdoor conditions peak yields are possible only under conditions of light limitation. Photosynthetic algae absorb light energy and convert it to stored chemical energy under rigid adherence to the laws of thermodynamics. By examining the basic physics of photosynthesis, it is possible to clearly demonstrate that under conditions of full sunlight in the most ideal locations maximum yields of 30 to 40 gr/sq m/day can be expected. DOE

N79-26231# Oak Ridge National Lab., Tenn.
RELATIVE CHEMICAL COMPOSITION OF SELECTED SYNTHETIC CRUDES
W. H. Griest, M. R. Guerin, B. R. Clark, C. Ho, I. B. Rubin, and A. B. Jones 1978 21 p refs Presented at Symp. on Assessing the Ind. Hygiene Monitoring Needs for the Coal Conversion and Oil Shale Ind., Upton, N. Y., 5 Nov. 1978
(Contract W-7405-eng-26)
(CONF-781150-4) Avail: NTIS HC A02/MF A01

A knowledge of the composition of synthetic crudes can provide an important input into the assessment of occupation exposure monitoring requirements for the coal conversion and oil shale industries. Comparative compositional studies of coal and shale-derived crude oils with petroleum crude oils as a reference point are summarized. DOE

N79-26232# Institute of Gas Technology, Chicago, Ill.
PROCESS DESIGN FOR COAL CONVERSION REACTORS
W. W. Bodle, A. T. Talwalkar, and D. V. Punwani 12 Nov.

1978 24 p refs Presented at 71st AICHE Natl. Meeting, Miami, Fla., 12-16 Nov. 1978
(Contract EX-76-C-01-2286)
(CONF-781110-15) Avail: NTIS HC A02/MF A01

There are many cases where general design procedures developed for other industries cannot be applied to coal conversion systems until after suitable modifications were made to account for (1) differences in types of materials handled, or (2) differences in processing conditions. For example, in the petroleum industry, design criteria were developed for designing fluidized-bed catalytic cracking units. These design criteria are not generally applicable to coal conversion systems because cracking catalyst has unique properties (ultrafine particles of low density), and because higher temperatures and pressures may be employed in coal conversion systems. It is the purpose to call attention to some of the design data and procedures included in the Coal Data Book and to illustrate their use by application to the design of a particular hypothetical reactor system for converting coal to fuel gas and oil. DOE

N79-26233# California Univ., Davis.
THE PRODUCTION OF ETHANOL FROM AGRICULTURAL WASTE: AN ECONOMIC EVALUATION Final Report
David Paige and Roger Boulton Jan. 1979 31 p refs Sponsored by Calif. Energy Commission
(PB-292552/7; CAEC-28) Avail: NTIS HC A03/MF A01 CSCL 21D

The quantities of wet waste and dry waste available in California are estimated. Economic analyses based on investment rate of return are developed for four alternate process schemes, varying in complexity from a simple pretreatment, fermentation, and distillation process to a process involving pretreatment, enzymatic hydrolysis, concentration, aerobic enthanol fermentation, and distillation. The hypothesized schemes use tomato and peach cannery wastes and/or rice straw as feedstocks. The economic sensitivity to plant size, enthanol market price, and waste treatment credit is shown. Annual investment rates of return of from 7 to 12 percent are calculated. GRA

N79-26234# Battelle Columbus Labs., Ohio.
FUEL CONTAMINANTS. VOLUME 3: CONTROL OF COAL-RELATED POLLUTANTS Final Report, Jul. 1975 - 1978
E. J. Mezey, Seongwoo Min, B. R. Allen, W. C. Baytos, and Surjit Singh Jan. 1979 135 p refs
(Contract EPA-68-02-2112)
(PB-293328/1; EPA-600/7-79-025A) Avail: NTIS HC A07/MF A01 CSCL 21D

The results of a study to identify strategies for removing pollutants from coal and coal derived liquids are reported. Study findings include: (1) enhancement of pyrite removal during immiscible fluid agglomeration--removal equivalent to that obtained for float-sink analysis was obtained by pretreatment and oil agglomeration, (2) extraction of clean fuels from coal liquids--light hydrocarbons can be used to extract 83% of coal liquid at supercritical conditions to yield a low sulfur and nitrogen fuel; (3) concentration of organic sulfur and nitrogen and ash from coal liquids--up to 76% of the sulfur and about 10% of the nitrogen can be removed by passing coal liquids over various special porous media; and (4) conversion of coal liquefaction residues to environmentally acceptable fuels. GRA

N79-26235# Lockman and Associates, Monterey Park, Calif.
RECOVERY, PROCESSING, AND UTILIZATION OF GAS FROM SANITARY LANDFILLS Final Report, Mar. 1977 - Sep. 1978
Robert K. Ham, Kenneth K. Hekimian, Stanley L. Katten, Wilbur J. Lockman, and Ronald J. Lofy Feb. 1979 147 p refs
(Contract EPA-68-03-2536)
(PB-293165/7; EPA-600/2-79-001) Avail: NTIS HC A07/MF A01 CSCL 21D

Topics covered include: The three-component gas generation phenomenon; analysis and comparison of alternative gas utilizations including the processes necessary to prepare the gas for use; an evaluation of various landfill design approaches and operations techniques that show promise for enhancing gas generation, recovery efficiency and quality; and recommendations for research, development and demonstration projects deemed necessary to develop an adequate data base to proceed with more in depth engineering evaluations of the various options. Overall, it is shown that landfill gas recovery, processing and utilization is technically feasible and can be economically viable. GRA

N79-26236# Battelle Columbus Labs., Ohio.
FUEL CONTAMINANTS, VOLUME 4: APPLICATION OF OIL AGGLOMERATION TO COAL WASTES Final Report, Aug. 1977 - Apr. 1978
E. J. Mezey, Seongwoo Min, and Dale Folsom Jan. 1979 95 p refs
(Contract EPA-68-02-2112)
(PB-293210/1; EPA-600/7-79-025B-Vol-4) Avail: NTIS HC A05/MF A01 CSCL 08I

Several approaches to enhance pyrite removal during agglomeration and to demonstrate the utility of the technology to reduce the environmental impact of increased quantities of coal cleaning refuse were investigated. Results show that the coal recovered is of better quality than the coal now being shipped from the mine, in that sulfur and ash values are lower. Coal value recoveries were greater than 90%. GRA

N79-26237# General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.
COMPENDIUM REPORTS ON OIL SHALE TECHNOLOGY
G. C. Slawson, Jr. and T. F. Yen Jan. 1979 224 p
(Contract EPA-68-03-2449)
(PB-293279/6; GE77TMP-52; EPA-600/7-79-039) Avail: NTIS HC A10/MF A01 CSCL 08I

The various production processes (mining, retorting, and oil upgrading) and key environmental factors (organic and inorganic characterization, environmental control, and limitations) related to oil shale development are discussed. This state-of-the-art survey supports a study designing a groundwater quality monitoring program for oil shale operations such as that proposed for Federal Oil Shale Lease Tracts U-a and U-b located in northeastern Utah. Technologies applicable to this development are emphasized while a general overview of oil shale technology is given. GRA

31 ENGINEERING (GENERAL)

Includes vacuum technology; control engineering; display engineering; and cryogenics.

N79-26238 Florida Univ., Gainesville.
MULTIPARAMETRIC OPTIMIZATION OF FOUR-BAR AND SIX-BAR LINKAGES Ph.D. Thesis
Kim Loring Spitznagel 1978 249 p
Avail: Univ. Microfilms Order No. 7913317

An approach for four-bar and six-bar linkage optimization relative to numerous design criteria is presented. A linkage solution set is synthesized through an analytical combination of curvature transform theory, inversion, Robert's cognates, and angular cognates under the specification of one of twelve possible types of motion specification. Evaluations are made first on the basis of necessary conditions, and then on the basis of assigned weighting factors and design zones relative to the optimization criteria. Subsequent expansions and refinements through resynthesis about the best linkages are used to approach an optimum solution. The detailed design for an interactive computer program to implement the analytics is presented and discussed. The appendices include synthesis procedures, necessary condition evaluations, program module tables, and sample programs. Dissert. Abstr.

N79-26239 Colorado State Univ., Fort Collins.
WIND EXCITED MOTION OF BUILDINGS Ph.D. Thesis
Ahsan Kareem 1978 338 p
Avail: Univ. Microfilms Order No. 7913820

A wind tunnel study of a square cross-section building model immersed in thick turbulent boundary layers simulating two typical neutral atmospheric flow conditions was undertaken in order to determine the fluctuating crosswind force and the effects of incident flow properties on the fluctuating pressure field acting on the model. The procedure developed permits the crosswind

acceleration levels of square cross-section tall buildings to be estimated at the preliminary design stages. Measurements were conducted to investigate the causes and effects of interaction due to upstream and surrounding buildings. The pertinent problem parameters of human biodynamic sensitivity to building motion were identified. An analysis for the design of a passive energy dissipative device (tuned mass damper) was carried out.
Dissert. Abstr.

N79-26240# Electricite de France, Chatou. Div. Etudes Generales and Methodes.
COMPARISON OF DIFFERENT TECHNIQUES FOR PRODUCING HYDROGEN: PRODUCTION COSTS ANALYSIS [COMPARISON DES PROCEDES DE PRODUCTION D'HYDROGENE - ELEMENTS D'APPRECIATION DES COUTES DE PRODUCTION]
J. Y. Portas Dec. 1976 79 p refs In FRENCH
(P/51/76/14) Avail: NTIS HC A05/MF A01

A multivariable economic analysis of different techniques available, or under study, for the production of hydrogen as an alternative energy source is given. Present and projected costs of hydrogen production by electrolysis are considered. Alternative techniques such as vapor reconstitution or partial oxidation of hydrocarbons, coal gasification, and thermochemistry are also evaluated. Finally, an in depth cost analysis of methods for obtaining hydrogen by electrolysis is made in order to provide a basis for comparison with other techniques. Author (ESA)

N79-26241# Maryland State Highway Administration, Brooklandville.
PERFORMANCE STUDY OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENT ON I-95 Final Report
Gopal N. Shah Jun. 1978 147 p refs Sponsored in part by Federal Highway Admin.
(PB-292930/5; FHWA/MD/R-78/11) Avail: NTIS HC A07/MF A01 CSCL 13B

The performance of the CRCP on I-95 was evaluated. Pavement observations and measurements were made on all construction contracts and included intensive crack surveys, measurements of the widths of selected cracks, measurements of changes of width of terminal joints and expansion joints, road roughness, Present Serviceability Index (PSI) determinations, and skid resistance. The results and observations and measurements made during the entire study are presented. The evaluation of observations and test results indicate that in general the I-95 pavement structure is sound and it has exhibited satisfactory performance. Also, it was observed that the width of a crack is greatest and most noticeable at the surface. GRA

N79-26242# Illinois State Dept. of Transportation, Springfield. Bureau of Materials and Physical Research.
CONTINUOUSLY REINFORCED CONCRETE OVERLAYS ON EXISTING PORTLAND CEMENT CONCRETE PAVEMENTS Interim Report, 1967 - 1977
Jagat Singh Dhamrait and Donald R. Schwartz May 1978 39 p refs
(PB 293043/6; Physical Research-80; FHWA/IL/PR-80) Avail: NTIS HC A03/MF A01 CSCL 13C

Three thicknesses of overlay and two separate amounts of longitudinal reinforcement were used in the experimental sections. Observations and measurements were carried out over a 10 year period to evaluate the behavior of the experimental overlays under I-80 regular mixed traffic. During that period the pavements carried in excess of 7,000,000 equivalent 18-kip single-axle load applications with very little change in riding quality or level of service, without requiring any structural maintenance. Transverse cracking followed the normal trend for regular CRC pavement, and edge deflections were very small for all test sections. Changes in transverse crack width from summer to winter were small for all sections, and decreased with increasing slab thickness. Recommendations are included for design and construction of overlays relative to minimum overlay thickness, amount of longitudinal steel, use of a bituminous leveling course as a bond breaker, and tolerances for overlay thickness control during construction. GRA

N79-26243# Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.
SIMPLE MODELS FOR COMPUTING DYNAMIC RESPONSES OF COMPLEX FRAME STRUCTURES
C. C. Chen, C. T. Sun, J. L. Bogdanoff, and H. Lo Apr. 1978 96 p refs
(Grants NSF GI-41897; NSF ENV-74-01575)
(PB-292798/6; NSF/RA-780529) Avail: NTIS HC A05/MF A01 CSCL 13M

The development of a simple shear beam and a Timoshenko base model for dynamic analysis of complex frame structures is described. Formulas are derived for computing the equivalent shear and bending rigidities of the structure. Simple models are evaluated by comparing simple model solutions with solutions obtained from using full scale finite elements in free vibrations of plane frames. It was found that the simple models yield very accurate frequencies as well as mode shapes for the lower modes, and the Timoshenko model is more superior to the shear beam model when diagonal bracings are present. The shear beam model was employed to compute the natural frequencies of a TVA fossil fuel power plant at Paradise, Kentucky. GRA

N79-26244# Purdue Univ., Lafayette, Ind. School of Aeronautics and Astronautics.
THEORETICAL STUDY OF THE DYNAMIC RESPONSE OF A CHIMNEY TO EARTHQUAKE AND WIND
T. Y. Yang, L. C. Shiau, Hsu Lo, and J. L. Bogdanoff 1 Apr. 1978 149 p refs
(Grant NSF ENV-74-051575)
(PB-293561/7; NSF/RA-780527) Avail: NTIS HC A07/MF A01 CSCL 13M

Analytical studies of the elastic and inelastic responses of a chimney to an earthquake are performed. The chimney studied is at the steam generating plant at Paradise, Kentucky of Tennessee Valley Authority. The geometry and the material property of the chimney at a TVA power plant are described. An existing computer program SAP 4 is employed to study the elastic response of the chimney. Both time history and response spectrum analyses are employed to obtain the displacements and forces at various heights of the chimney. A simple method is developed to generate the ground response spectrum as the input data for the response spectrum analysis. GRA

N79-26245# Nebraska State Dept. of Roads, Lincoln. Materials and Tests Div.
STRUCTURAL DESIGN OF FLEXIBLE PAVEMENT. PART 1: SUMMARY OF PERFORMANCE Final Report
A. R. Kennedy and R. J. Wedner, Jr. Jun. 1978 114 p refs Sponsored by DOT
(PB-292787/9; Research Study-63-14-Pt-1; R78-4-536-Pt-1; FHWA/RD-79-S0815-Pt-1) Avail: NTIS HC A06/MF A01 CSCL 13B

The performance data accumulated since 1966 is included for a number of in service flexible pavements. It was concluded that: (1) the performance study results appear to confirm the concept that a pavement structure eventually deteriorates as it is subjected to the effects of cumulative traffic loads, and (2) an evaluation of the deterioration can be obtained through PSI measurements. It was presupposed that the PSI can be used for development of a flexible pavement design for Nebraska.
GRA

N79-26246# Nebraska State Dept. of Roads, Lincoln. Materials and Tests Div.
STRUCTURAL DESIGN OF FLEXIBLE PAVEMENT. PART 3: ANALYSIS OF PERFORMANCE STUDY DATA Final Report
A. R. Kennedy and R. J. Wedner, Jr. Jun. 1978 61 p refs Sponsored in part by Federal Highway Admin.
(PB-292838/0; FHWA/RD-79-S0816; R78-4-536) Avail: NTIS HC A04/MF A01 CSCL 13B

Traffic, pavement thickness and strength, pavement loss in serviceability, triaxial strength test results for subgrade soils, and spring loss in bearing capacity of pavements were resolved to terms analogous to those used for the AASHO road test. The AASHO terms used are structural number, PSI, soil support value, regional factor, and equivalent 18 kip axle loads. These elements were evaluated and design equations developed for Nebraska conditions. GRA

32 COMMUNICATIONS

Includes land and global communications; communications theory; and optical communications.

For related information see also *04 Aircraft Communications and Navigation* and *17 Spacecraft Communications, Command and Tracking.*

N79-26247 Georgia Inst. of Tech., Atlanta.
ANALYSES OF REFRAMING PERFORMANCE OF MULTILEVEL SYNCHRONOUS TIME DIVISION MULTIPLEX HIERARCHY Ph.D. Thesis
Shyan-shiang S. Liu 1979 250 p
Avail: Univ. Microfilms Order No. 7913846

To ensure proper operations of Synchronous Time Division Multiplexing (STDM) systems, the frame synchronization method must be applied to keep the multiplexing and demultiplexing operations in synchronization. A method was developed for analyzing the reframing performance of multilevel STDM hierarchies. The research consisted of four steps: (1) development of a mathematical model which characterizes both the single level reframing operations and the interactions of the reframing process between levels; (2) development of an efficient method for numerical solution of the mathematical model; (3) study of several specific hierarchies using the model(1) and numerical method(2); and (4) verification of the method through direct simulation of the specific hierarchies(3). Dissert. Abstr.

N79-26248 Illinois Univ. at Urbana-Champaign, Urbana.
CODING FOR THE CONTROL OF INTERSYMBOL INTERFERENCE IN BASEBAND CHANNELS Ph.D. Thesis
Val Anthony Dieuliis 1978 121 p
Avail: Univ. Microfilms Order No. 7913430

The relationship between the structure of line codes and the error probability for baseband PCM systems with intersymbol interference is studied for a broad class of finite-state-machine codes. The model for a repeat transmission line is reduced to a digital model including the line encoder, linear dispersive digital channel, additive Gaussian noise, and a fixed threshold detector. The error probability for a first order channel model (exponential response) is found numerically using the Gram-Charlier series representation for the Gausian noise probability density function. In order to accomplish this computation, the moments of the intersymbol interference are derived for this channel model via a property of the encoded channel sequence statistics. Dissert. Abstr.

N79-26249 Georgia Inst. of Tech., Atlanta.
A LONGITUDINAL COUPLING MECHANISM IN MULTIPAIR CABLE CROSSTALK Ph.D. Thesis
William Thomas Anderson 1979 158 p
Avail: Univ. Microfilms Order No. 7913792

The theory for longitudinal coupling crosstalk between two arbitrarily excited and terminated two-mode pairs was developed. By assuming weak coupling (i.e., coupling occurs only from one pair to the other), the telegrapher's equations for the coupled lines separated into two sets of equations, one for the end-excited two-mode line and one for the two-mode line with distributed sources. Both were solved directly, the latter by a Green's Function approach. The resulting formulas predicted substantially different crosstalk behavior than previous theories. For example, Far End Crosstalk at 1 MHz increase as much as 18 dB per octave length and frequency instead of the 3 to 6 dB predicted previously. The resulting crosstalk was also a strong function of the pair unbalances and the distance between the pairs. Dissert. Abstr.

N79-26250 State Univ. of New York at Buffalo.
QUANTIZATION FOR STATISTICAL CLASSIFICATION Ph.D. Thesis
Theodore P. Cotsidas 1979 203 p
Avail: Univ. Microfilms Order No. 7913872

A suitable expression for evaluating the Bhattacharyya distance for Markov chains was derived. Then, the quantization of the observed Markov sequence for sequential detection was examined. The criteria, used to construct the quantizer, were the minimizations of the average sample number under the hypothesis and the average sample number under the alternative. The problem of approximating the joint probability density function of the output n-dimensional vector of the quantizer was considered from a decision theory viewpoint. Dissert. Abstr.

N79-26251 Missouri Univ. -Rolla.
THE PHYSICS OF BRAIDED-SHIELD COAXIAL CABLE Ph.D. Thesis
Charles Mancel McDowell 1978 204 p
Avail: Univ. Microfilms Order No. 7912455

Propagation along a braid-shielded coaxial cable was studied entirely from electromagnetic field-theoretic methods. A cable immersed in an infinite medium composed of its own dielectric is first treated by techniques originally used to analyze periodic slow-wave structures for traveling-wave tubes. The external dielectric is then perturbed away leaving the cable surrounded by free space. Solution for the field shows that over the useful range of frequencies the dominant mode inside the cable is closely approximated by the usual formulas for the TEM mode. The mode is truly TM, however, and this allows a minute amount of power to leak through the braid. Formulas derived for surface transfer impedance show a dependence on the cable dielectric not present in other theories. Dispersion curves are derived. Dissert. Abstr.

N79-26252*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A SCANNABLE BEAM-FORMING INTERFEROMETER ANTENNA ARRAY SYSTEM Patent Application
Julius A. Kaiser, Jr., inventor (to NASA) Filed 14 May 1979 18 p
(NASA-Case-GSC-12365-1; US-Patent-Appl-SN-039031) Avail: NTIS HC A02/MF A01 CSCL 20N

An antenna array comprising at least three interferometer pairs of antenna elements with selected spacings was made to form a single beam which was readily scannable. All spatial frequencies generated by a signal and intercepted by the array were derived from a signal processing technique applied to the array. The array sampled space in the spatial frequency domain while the signal processing technique utilized real time convolution of functions in the spectral frequency domain. Summation of the appropriate spatial frequencies was equivalent to a Fourier transform operation, yielding the location of the signal source in space. Resolution and freedom from interference of the interferometer system was equal to that of a fully filled array of the same aperture size containing element spacings of one-half wavelength. NASA

N79-26253*# National Aeronautics and Space Administration. Pasadena Office, Calif.
ECHO TRACKER/RANGE FINDER FOR RADARS AND SONARS Patent Application
Nick J. Constantinides, inventor (to NASA) (JPL) Filed 29 Jun. 1979 22 p
(Contract NAS7-100)
(NASA-Case-NPO-14361-1; US-Patent-Appl-SN-053572) Avail: NTIS HC A02/MF A01 CSCL 20N

An echo tracker/range finder or altimeter is described in which the pulse repetition frequency (PFR) of a predetermined number of transmitted pulses is adjusted so that echo pulses received from a reflecting object are positioned between transmitted pulses and divide their interpulse time interval into two time intervals having a predetermined ratio with respect to each other. The thus-adjusted PRF is related to the range of the reflecting object. In addition, the invention provides a means whereby the arrival time of a plurality of echo pulses is defined as the time at which a composite echo pulse formed of a sum of the individual echo pulses has the highest amplitude. An especially useful application is in determining altitude information for an aircraft or an orbiting spacecraft utilizing a synthetic aperture imaging radar system. However, it could be used with sonar systems, laser ranger finders, or any other kind of rangefinding application in which a number of pulses are received. NASA

N79-26254# Harry Diamond Labs., Adelphi, Md.
DESIGN OF VHF AND UHF COMMUNICATIONS AIR/GROUND ANTENNAS Final Report, Feb. 1978 - Feb. 1979
F. Farrar, D. Schaubert, and H. Jones Mar. 1979 60 p ref

(Contract DOT-FA78WAI-851)
(AD-A067307; FAA-RD-79-22) Avail: NTIS HC A04/MF A01 CSCL 09/5

The performance of the candidate antennas in a simulated operational environment is calculated and presented for several sets of conditions which closely resemble operational applications. While the predominant FAA requirements are satisfied by antennas presently available to the Agency, very significant gain deficiencies were detected in multiple-achieve inter-element electrical isolation. M.M.M.

N79-26255# Army Armament Research and Development Command, Aberdeen Proving Ground, Md. Ballistics Research Lab.

COMPUTER SIMULATION OF ELECTRON-BEAM-CAVITY INTERACTIONS IN COAXIAL GEOMETRY

R. Shnidman Jan. 1979 50 p refs
(DA Proj. 1T1-61101-A-91A)
(AD-A066130; AD-E430191; ARBRL-TR-02131) Avail: NTIS HC A03/MF A01 CSCL 20/7

Computer simulation of electron beams interacting with electromagnetic pulses generated in internally switched cavities is presented. The formulation and properties of the algorithms for the electromagnetic field propagation and particle motion are given. Results are shown for coaxial geometry, first showing the electromagnetic pulse propagation properties in the absence of a beam and then the interaction with a beam. The calculated accelerated beam has a risetime of a fraction of a nanosecond and the quality of the accelerated beam depends critically on the synchronization of the beam with the electromagnetic pulse. The limitations of the present version of the computer code and the directions for future work are discussed. A users guide for the code is provided as an appendix. Author (GRA)

N79-26256# Naval Ocean Systems Center, San Diego, Calif.

MINIMUF-3.5 IMPROVED VERSION OF MINIMUF-3, A SIMPLIFIED HF MUF PREDICTION ALGORITHM

R. B. Rose and J. N. Martin Dec. 1978 10 p
(AD-A066256; NOSC/TD-201) Avail: NTIS HC A02/MF A01 CSCL 20/14

Within an 800-8000 km range, the original MINIMUF-3 reported in NOSC TR 186 will predict hf MUF within specified confidence limits. But the development of new applications involving very long transmission paths uncovered several bugs. Corrections are reported here that do not affect the original accuracy limits but do allow MINIMUF to be used out to the antipodal point. This document presents the most current model, called MINIMUF-3.5, describes the improvements, and presents a data set with which each user can check out his version of MINIMUF-3.5. Author (GRA)

N79-26257# University of Southern California, Marina del Rey.

TRANSMISSION CONTROL PROTOCOL (TCP) VERSION 4

Feb. 1979 76 p Sponsored by DARPA
(AD-A067072) Avail: NTIS HC A05/MF A01 CSCL 17/2

The Transmission Control Protocol (TCP) is intended for use as a highly reliable host-to-host protocol between hosts in packet-switched computer communication networks, and especially in interconnected systems of such networks. This document describes the functions to be performed by the Transmission Control Protocol, the program that implements it, and its interface to programs or users that require its services. GRA

N79-26258# Lincoln Lab., Mass. Inst. of Tech., Lexington.

A GAUSSIAN NOISE ANALYSIS OF THE PSEUDO-COHERENT DISCRIMINANT

Robert E. Stovall 29 Dec. 1979 26 p refs
(Contract F19628-78-C-0002; ARPA Order 2752)
(AD-A067103; TN-1978-46; ESD-TR-78-395) Avail: NTIS HC A03/MF A01 CSCL 17/9

The Pseudo-Coherent Discriminant for radar detection of fixed targets in ground clutter is investigated. Performance of the technique in Gaussian noise interference is analyzed and compared with Marcum's results for square law detection of a steady signal. Author (GRA)

N79-26259# Electronics Engineering Group (1842nd), Scott AFB, Ill.

AN/UYA-7 INTERFACE FOR USAF HF AERONAUTICAL STATIONS

Timothy A. Batliner 30 Mar. 1979 23 p
(AD-A067148; Rept-1842-EEG/EETT-TR-79-9) Avail: NTIS HC A02/MF A01 CSCL 09/2

This report describes the design of a circuit card which provides an interface between an AN/UYA-7, Digital Data Group, and a USAF high frequency aeronautical station (Scope Control). Author (GRA)

N79-26260# General Electric Co., Santa Barbara, Calif. Center for Advanced Studies.

WEDCOM 4: A FORTRAN CODE FOR THE CALCULATION OF ELF, VLF, AND LF PROPAGATION IN A NUCLEAR ENVIRONMENT. VOLUME 3: COMPUTATIONAL MODELS Topical Report, 15 Oct. 1977 - 1 Nov. 1978

Royden R. Rutherford 1 Nov. 1978 91 p refs Revised
(Contract DNA001-78-C-0043)
(AD-A066977; AD-E300473; GE77TMP-33-Vol-3; DNA-4422T-3) Avail: NTIS HC A05/MF A01 CSCL 20/14

This document describes electromagnetic propagation computational models used in WEDCOM IV, a computer code that calculates ELF, VLF, and LF electric and magnetic field strengths in nuclear-disturbed environments. GRA

N79-26261# State Univ. of New York at Buffalo. Dept. of Engineering Science, Aerospace Engineering, and Nuclear Engineering.

BOUNDARY INTEGRAL EQUATION METHODS APPLIED TO WAVE PROBLEMS Final Report

Richard Paul Shaw Jan. 1979 46 p refs Repr. from Developments in Boundary Element Methods (London), 1975 46 p
(Contracts N00014-75-C-0302; N00014-71-C-0108)
(AD-A067536) Avail: NTIS HC A03/MF A01 CSCL 20/4

An introduction is given to the application of boundary integral equation methods to the areas of wave propagation, radiation and scattering. Such applications were among the first for this method which made use of the power of modern digital computers; however, there is a long history of integral methods in this field. The emphasis here is on fundamental concepts coupled with illustrations of the application of this method. The breadth of the applications of this approach precludes any attempt at overall completeness and many details are left to an extensive, but undoubtedly incomplete, list of references. There is however sufficient material to formulate the solution of most problems, with some of the inevitable pitfalls indicated. Author (GRA)

N79-26262# Naval Ocean Systems Center, San Diego, Calif.

SHIPBOARD ANTENNA PATTERN INVERSION USING PRONY'S METHOD Final Report

J. C. Logan and J. W. Rockway 30 Sep. 1978 62 p refs
(AD-A068018; NOSC/TR-362) Avail: NTIS HC A04/MF A01 CSCL 20/14

Because far field antenna patterns can be expressed in terms of an exponential series of the spatial distribution of the source, they are candidates for Prony processing. Prony's method is used here to invert antenna pattern data to obtain the source distribution. Applications to pattern data characterization and pattern data compression are demonstrated. Author (GRA)

N79-26263# Naval Ocean Systems Center, San Diego, Calif.

RADAR SYSTEM ANALYSIS ALGORITHMS: RADAR SYSTEM ANALYSIS MODELS OF PERFORMANCE DEGRADATION BY MUTUAL INTERFERENCE Final Report, Oct. 1976 - Oct. 1978

S. T. Li 18 Oct. 1978 60 p refs
(AD-A068019; NOSC/TD-212) Avail: NTIS HC A04/MF A01 CSCL 17/9

This report provides an overview of current radar system analysis models. It is an initial effort toward a radar system analysis capability as part of the Electromagnetic Environment (EMX) Program. The principles and approach of the EMX Program are outlined, existing radar system analysis models are briefly discussed, and a functional background of basic radar systems and environments is provided. The major effort is a narrative

analysis of the principles and limitations of current radar analytical models and techniques. A new radar system analysis model is offered and the development of both a radar design algorithm and performance evaluation algorithm is recommended.
Author (GRA)

N79-26264# Ball Bros. Research Corp., Boulder, Colo. Aerospace Div.
MICROSTRIP MILLIMETER WAVE ANTENNA STUDY Final Report, 1 Aug. 1977 - 31 Oct. 1978
Michael A. Weiss and Richard B. Cassell Apr. 1979 62 p refs
(Contract DAAB07-77-C-0158)
(AD-A067948; F78-16; CORADCOM-77-0158-F) Avail: NTIS HC A04/MF A01 CSCL 09/5

The study was conducted primarily to investigate the feasibility and potential of integrating the front-end mixer circuit of a millimeter wave receiver into a microstrip antenna array. Development was concentrated in three areas: Investigate the practicality of conformal microstrip antennas in the millimeter wavelength region; specifically a 32 X 32 element array operating at 38.4 GHz was designed, fabricated and tested; Investigate possible designs for a front-end mixer circuit (i.e., local oscillator and mixer) which are compatible with the goal of incorporation into the microstrip antenna array; Design, fabricate, and analyze candidate circuits; and Integrate candidate front-end circuit into microstrip antenna array. Author (GRA)

N79-26265# Kentucky Univ., Lexington.
EXTRAPOLATION OF INDUCED TRANSIENT SURFACE CURRENTS ON A SCATTERER TO GENERAL BAND LIMITED EXCITATION CONDITIONS Interim Technical Report, 1 May 1977 - 1 Oct. 1978
L. Wilson Pearson and D. Randall Roberson Oct. 1978 57 p refs
(Contract N00014-77-C-0362)
(AD-A067672; RR-78-3) Avail: NTIS HC A04/MF A01 CSCL 20/3

A technique for the extraction of an approximate Singularity Expansion description of the electromagnetic response of a scatterer is presented. The description is extracted from transient waveforms which are spatial samples of the transient current on the scatterer excited by a known excitation. The method can use any reliable Prony-type processor for exponential analysis of the transient waveforms so long as it provides physically-meaningful poles from the waveforms. The fact that Singularity Expansion poles are common to all waveforms on the object provides a computational advantage over a waveform-by-waveform Prony-type analysis. A 'consensus pole set' procedure is described to exploit this redundancy. Some issues relating to the completeness of a set of transient data to the class of excitations to which the Singularity Expansion is applied is discussed. The one-dimensional example of a thin-wire scatterer is used to test the practicability of the method. The ultimate utility of the method is demonstrated by way of expansion of the extracted data to new excitations. Recommendations are made toward an implementation of the method using measured data. Author (GRA)

N79-26266# Kiruna Geophysical Inst. (Sweden).
SNR FOR THE EISCAT UHF SYSTEM
John Murdin Feb. 1978 22 p refs
(KWI-78-1) Avail: NTIS HC A02/MF A01

The signal to noise ratios were calculated for the EISCAT UHF system. The effective scattering volume for the EISCAT UHF incoherent radar is expressed in a simple form assuming a Gaussian distribution of the relative power pattern of a uniformly illuminated parabolic reflector. From this the SNR can be calculated. Knowledge of the effective scattering volume is also required in order to calibrate the radar system for electron density measurements. Author (ESA)

N79-26267# Uppsala Ionospheric Observatory (Sweden).
ACCURATE DETERMINATION OF IONOSPHERIC EFFECTS ON SATELLITE BASED POSITIONING SYSTEMS USING A VERSATILE THREE-DIMENSIONAL RAY TRACING PROGRAM
G. O. Ajayi, A. Hedberg, and G. Hamberg 1978 22 p refs Presented at Symp. on Beacon Satellite Meas. of Plasmaspheric and Ionospheric Properties, Florence, May 1978 Sponsored in part by Swed. Intern. Develop. Agency
(UIO-SR-78-04) Avail: NTIS HC A02/MF A01

A three-dimensional ray tracing program, after modification for homing facilities, was used to study the variation of the Residual Range Error (RRE) with the angle of elevation. This ray tracing program makes use of the complete Appleton-Hartree formula for the refractive index without any approximation. The computed RRE values for the NAVSAT system, operating on 150 MHz, were compared with the results of earlier approximate methods. The effect of the magnetic field on the RRE was evaluated for both the NAVSAT and NAVSTAR (GPS) systems. The magnetic field can be completely neglected in the NAVSTAR system operating on 1200 MHz and 1600 MHz. The RRE was also computed for various electron density profiles for a constant total electron content (TEC). The RRE can be obtained for all practical profiles by using a simple Champman profile with the same TEC and almost the same slab thickness as the experimental profile. The accuracy in RRE obtained using the simple Champman profile is high enough even for geodetic applications.
Author (ESA)

N79-26268# Danish Research Center for Applied Electronics, Hoersholm.
STANDARDS AND REGULATIONS ON ELECTROMAGNETIC COMPATIBILITY (EMC). PART 1: NON-MILITARY STANDARDS AND NATIONAL REGULATIONS. SURVEY OF INTERNATIONAL AND NATIONAL STANDARDS AND REGULATIONS ON ELECTRICAL INTERFERENCE AND SUSCEPTIBILITY
H. S. Nissen May 1978 328 p Sponsored in cooperation with General direktoratet for Post- og Telegrafvaesenet Telegraf-laboratoriet, Vald. Selmar Trane og Hustru Elisa Trane's Fond., Danfoss A/S, Nordiske Kabel- og Traadfabriker A/S, A/S Regnecentralen, Jydsk Telefon-Aktieselskab, and KTAS 2 Vol.
(ECR-79-Pt-1) Avail: NTIS HC A15/MF A01; Elektronikcentralen, Hoersholm, Den. D.Kr 50

A survey of existing standards and regulations on electric interference in various countries was conducted. Non-military standards, and national regulations covering most of the developed countries are included. Author (ESA)

N79-26269# Danish Research Center for Applied Electronics, Hoersholm.
STANDARDS AND REGULATIONS ON ELECTROMAGNETIC COMPATIBILITY (EMC). PART 2: MILITARY AND SPECIAL INDUSTRIAL STANDARDS, REGULATIONS, AND RECCOMENDATIONS INTERNATIONAL AND NATIONAL STANDARDS, REGULATIONS, AND RECOMMENDATIONS ON ELECTRICAL INTERFERENCE AND SUSCEPTIBILITY
P. Krebs May 1978 168 p Sponsored in cooperation with Generaldirektoratet for Post- og Telegrafvaesenet Telegraflaboratoriet, Vald. Selmar Trane og Hustru Elisa Trane's Fond., Danfoss A/S, Nordiske Kabel- og Traadfabriker A/S, A/S Regnecentralen, Jydsk Telefon-Aktieselskab, and KTAS 2 Vol.
(ECR-80-Pt-2) Avail: NTIS HC A08/MF A01; Elektronikcentralen, Hoersholm, Den. D.Kr. 50

A survey of existing standards and regulations on electric interference in various countries is presented. Military and special industrial standards covering most of the developed countries are included. Author (ESA)

N79-26270# Fondazione Ugo Bordoni, Rome (Italy).
THE USE OF RHYMED POLYSYLLABIC WORDS IN STUDYING AURAL INTELLIGIBILITY INDOORS [IL METODO DELLE PAROLE RIMATE POLISILLABE PER GLI STUDI SULLA QUALITA DELL'ASCOLTO NEGLI AMBIENTI CHIUSI]
Foster Bianchi and Italo Barducci (Rome Univ.) Oct. 1977 15 p In ITALIAN
(FUB-30-1977) Avail: NTIS HC A02/MF A01

The use of the rhymed words method as a subjective way for evaluating the intelligibility index and hearing quality in closed areas is discussed. Successively described are the selection of phonetic material, the selection of the electro-acoustic system, the measurement of the relationship between intelligibility index and signal to noise ratio for the selected phonetic material, the

experimental organization, and a proposed scale for hearing quality evaluation. Some examples are given and results are discussed. It is concluded that the intelligibility index determination is influenced by the intensity level of syllables, the position of the syllable inside the word, and the number of syllables of each word. In rooms with high reverberation times it is necessary to use words with many syllables. For this reason the phonetic material for this particular use must be normalized. Author (ESA)

N79-26271# Fondazione Ugo Bordoni, Rome (Italy).
OUTPUT CAPACITY OF THE STORED PROGRAM CONTROL (SPC) COMMUTATION SYSTEM [POTENZIALITA ELABORATIVA DI SISTEMI DE COMMUTAZIONE SPC]
Sergio R. Treves (Univ. of Turin) Nov. 1977 20 p In ITALIAN
(FUB-35-1977) Avail: NTIS HC A02/MF A01

The output capacity of a SPC system cannot be expressed only by the number of outlet lines and/or functions. How the SPC system capacity should be determined is discussed. For centralized control the working capacity is determined by the peak number of calls placed successfully or not as referred to a given time distribution of calls. If the average communication time is known, the traffic capacity can be expressed as a function of the number of calls. The complete characterization of a SPC commutation system must include both the calls distribution and the average time of communication. Author (ESA)

N79-26272# Fondazione Ugo Bordoni, Rome (Italy).
VIDEO TELEPHONIC SERVICE: STUDY ON THE INFLUENCE OF MICROPHONE CHARACTERISTICS AND BAND WIDTH ON INTELLIGIBILITY AND QUALITY OF AUDIO SIGNALS [SERVIZIO VIDEOTELEFONICO: STUDI SULLA INFLUENZA DELLE CARATTERISTICHE DEL MICROFONO E DELLA LARGHEZZA DI BANDA SULLA COMPRENSIBILITA E SULLA QUALITA DEL SEGNALE AUDIO]
Giovanni Ibba and Berardo Saverione Dec. 1977 36 p refs In ITALIAN
(FUB-36-1977) Avail: NTIS HC A03/MF A01

Subjective tests on intelligibility and quality of audio signals in videotelephonic transmissions were made. With signal to noise ratios of 42 db it is found that for bandwidths of from 100 to 8000 Hz intelligibility is 98% (rhymed words method) while it drops to 95% for bandwidths of from 300 to 3400 Hz and to 90% if the signal to noise ratio is reduced to 14 db. The influence of the type of microphone (carbon or transistorized) was found to be negligible for these tests. However, a preference was found for dynamic microphones when large bandwidths are used. Large bandwidths (200 to 5000 Hz or 100 to 8000 Hz) are preferred to the telephonic band (300-3400 Hz) when using carbon microphones as well as with more sophisticated microphones. Author (ESA)

N79-26273# Fondazione Ugo Bordoni, Rome (Italy).
QUASI-OPTICAL ELBOWS IN CIRCULAR WAVEGUIDE CONNECTIONS [GOMITI QUASI OTTICI NEI COLLEGAMENTI IN GUIDA D'ONDA CIRCOLARE]
Gabriele Falciasecca (Univ. of Bologne) and Sergio Rogai Dec. 1977 38 p refs In ITALIAN
(FUB-39-1977) Avail: NTIS HC A03/MF A01

The electromagnetic characteristics of elbow components in the circular microwave guide TE-01 mode are studied, since these have the advantage of construction simplicity. How much a large number of successive elbows deteriorates the wave fundamental characteristics is discussed. One possible solution to this problem involves special components such as upper circular mode electric filters. The maximum acceptable number of elbows per circuit path is shown to be 15 to 20. An extension of the limit is foreseeable by using elliptic elbows and double elbows at fixed distances so as to limit the conversion at the critical lowest frequency. A computer program is being developed to calculate noise from effective lay-out, to permit a selection between project alternatives. Author (ESA)

N79-26274# Fondazione Ugo Bordoni, Rome (Italy).
DESCRIPTION OF MAIN METHODOLOGIES USED FOR SPEAKER RECOGNITION [DESCRIZIONE DELLE PRINCIPALI METODOLOGIE UTILIZZATE PER IL RICONOSCIMENTO DEL PARLATORE]
Giovanni Ibba and Andrea Paoloni Apr. 1976 20 p refs In ITALIAN
(FUB-1-1978) Avail: NTIS HC A02/MF A01

A survey was made of the main methods for voice recognition. The problem involves recognizing a person by his voice and has many fields of application. The physical characteristics of the human voice are reviewed. Several recognition methods are illustrated by examples and charts. Author (ESA)

N79-26275# Fondazione Ugo Bordoni, Rome (Italy).
REPORT ON COLLABORATION ACTIVITY BETWEEN THE 'ISTITUTO SUPERIORE POSTE E TELECOMUNICAZIONI' AND THE UGO BORDONI FOUNDATION IN 1977 Annual Report [RELAZIONE SULL'ATTIVITA DI COLLABORAZIONE CON ISPT SUOLTA DALLA FONDAZIONE UGO BORDONI NEL 1977]
Renato Koch Feb. 1978 48 p refs In ITALIAN
Avail: NTIS HC A03/MF A01

Joint research activities and studies are described. Main subjects are radio communication systems, digital systems and cable communication, automatic communication systems for management and control, and laser as well as optoelectronic systems. Consulting and didactic activities, technical collaboration and participation in scientific congresses are also reviewed. Author (ESA)

N79-26276# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
RADIATION SAFETY IN THE USE OF COLOR TELEVISION SETS [PROBLEMI DI RADIOPROTEZIONE NELL IMPIEGO DI TELEVISORI A COLORI]
A. Calicchia, A. Panigutti, and A. Rosati 20 May 1977 20 p refs In ITALIAN;, ENGLISH summary
(ISS-T-77/4) Avail: NTIS HC A02/MF A01

The safety of color television sets was investigated using F2Cd thermoluminescent dosimeters. Measured results at 5 cm from the color television set show less than 1/30 of the maximum limit as set by Italian law, that is 0.5 mR/h. Problems specific to personnel who work daily in close contact with color television sets were not considered. Author (ESA)

N79-26277# Unilever Research, Vlaardingen (Netherlands).
THE PROPAGATION OF SURFACE SHEAR WAVES. VOLUME 1: THEORY
J. A. deFeijter 1978 24 p refs Revised Submitted for publication 2 Vol.
Avail: NTIS HC A02/MF A01

A theory is developed which predicts that liquid surfaces can carry a so-called surface shear wave. This type of surface wave is characterized by the fact that the direction of the surface motion is perpendicular to the propagation direction of the wave (transverse wave), but, in contrast to the capillary and gravity waves, is in the plane of the surface. The wave equations of a plane and a circular surface shear wave are derived and their validity range is indicated. It is found that the wavelength and damping coefficient depend on the complex shear modulus of the liquid surface. Author (ESA)

N79-26278# Unilever Research, Vlaardingen (Netherlands).
THE PROPAGATION OF SURFACE SHEAR WAVES. VOLUME 2: EXPERIMENTS
J. A. deFeijter and J. Benjamins 1978 26 p refs Submitted for publication 2 Vol.
Avail: NTIS HC A02/MF A01

A technique is presented by which surface shear waves can be generated. The technique is applied to surfaces of protein solutions. It is found that the surface motion is described satisfactorily by theory. The results indicate that the surfaces of the protein solutions show visco-elastic shear behavior. The values of the shear parameters, as calculated from the wave characteristics, are of the order to be expected for protein solutions. In principle, surface shear waves can be used to study the shear properties of liquid surfaces. Author (ESA)

N79-26279# Royal Aircraft Establishment, Farnborough (England).
LOW NOISE DEVICES FOR SATELLITE COMMUNICATION SYSTEMS

M. T. Brian London 6 Jul. 1978 74 p refs
(RAE-TR-78076; BR64934) Avail: NTIS HC A04/MF A01

The current state-of-the-art in RF low noise front end components for use in satellite communication receivers is outlined. To illustrate the importance of the receiver front end, the various noise components in the complete communication system are described. Some typical examples of low noise receivers are given. Author (ESA)

N79-26280# Laboratorio di Ricerca e Technologia per lo Studio del Plasma nello Spazio, Frascati (Italy).
AVERAGING FILTER FOR ANALOG PROCESSING OF GRAVITATIONAL SIGNALS
P. Bonifazi and G. V. Pallottino Oct. 1978 29 p refs
(LPS-78-10) Avail: NTIS HC A03/MF A01

The extraction of a dc signal from fluctuation noise by means of various types of integrators with the aim of minimizing the residual variance under the constraint of a given response speed, expressed in terms of settling time of the averaging filters, is considered. Several solutions are discussed and compared. Experimental results are presented for specific devices that are being used in the analog processing systems for the gravitational wave experiments in Rome, Italy. Author (ESA)

N79-26281# Fondazione Ugo Bordoni, Rome (Italy).
DETERMINATION OF THE STATISTICAL PROPERTIES OF THE DIGITAL SUM OF LINE CODES TO EVALUATE THE RELATIVE AVERAGE INCREASE IN ERROR PROBABILITY DUE TO LOW FREQUENCY DISTORTION IN DATA TRANSMISSION [DETERMINAZIONE DELLE PROPRIETA STATISTICHE DELLA SOMMA DIGITALE CORRENTE DEI CODICI DI LINEA PER LA VALUTAZIONE DELL INCREMENTO MEDIO RELATIVO DELLA PROBABILITA D ERRORE DOVUTO ALLA DISTORSIONE IN BASSA FREQUENZA NEI COLLEGAMENTI NUMERICI SU CAVO]
Odoardo Brugia, Romolo Pietroiusti (Direzione Gen. SIP), Giuseppe Maria Poscetti (Rome Univ.), and William Wolfowicz Apr. 1978 50 p refs In ITALIAN
(FUB-3-1978) Avail: NTIS HC A03/MF A01

An approximate relationship was developed between the average increase in error probability caused by low frequency distortion to the variance and dynamics of the digital sum of line codes as well as to the high-pass coupling characteristics existing in the connection. The variance of several codes was evaluated and related to the low cutoff frequency of first to fourth order multiplexing in a table calculated by the above mentioned relationship. The relative increase in error probability, considering a base error probability = or > 10 to the -10th power, is least for the AMI code and greatest for the 4B-3T code. It is also noticed that second order multiplexing (30KHz low cutoff) has the higher relative error, while fourth order multiplexing (150KHz) shows the minimum (0.01 for the AMI code). Author (ESA)

N79-26282# Fondazione Ugo Bordoni, Rome (Italy).
A METHOD FOR THE FORMAL DESCRIPTION OF SIGNALING SYSTEMS [METODOLOGIA 'PER LA DESCRIZIONE FORMALE DI SISTEMI DI SEGNALAZIONE]
Sergio R. Treves (Politec. di Torino) Jul. 1978 26 p ref In ITALIAN
(FUB-4-1978) Avail: NTIS HC A03/MF A01

The use of state tables to describe traffic signal sequences, using the principle of a 'finite state machine', is described. The method is considered a helpful extension of the recently developed specification and description language graphic method. A complete and formal description of the signaling systems, avoiding ambiguity, is claimed. Author (ESA)

N79-26283# Fondazione Ugo Bordoni, Rome (Italy).
CONSIDERATIONS ABOUT 2.6/9.5 COAXIAL CABLE CHARACTERIZATION RELATED TO HIGH CAPACITY DIGITAL SYSTEMS CARRIER UTILIZATION [CONSIDERAZIONI SULLA CARATTERIZZAZIONE DEL CAVO COASSIALE 2.6/9.5 FINALIZZATA AL SUO IMPIEGO COME PORTANTE DI SISTEMI NUMERICI AD ELEVATA CAPACITA]
Luigi Giacomelli (Ancona, Italy) and Aldo Roveri (Rome Univ.) Sep. 1978 5 p refs In ITALIAN
(FUB-7-1978) Avail: NTIS HC A02/MF A01

Impedance irregularity effects and additional measurements necessary to better characterize coaxial cables are discussed. In spite of experimental verification of an insufficiency in structural reflection attenuation measurements, it was observed that degradation in actual systems is not important, at least up to digital rates of 750 Mbaud. Better measurements are nevertheless judged necessary to improve knowledge of parameters related to the inlet-outlet transfer function up to 1 GHz. Author (ESA)

N79-26284# Fondazione Ugo Bordoni, Rome (Italy).
CONTROL PROCEDURES IN BLOCK COMMUTATION NETWORKS, PART 1 [PROCEDURE DI CONTROLLO NELLE RETI A COMMUTAZIONE DI PACCHETTO (PARTE PRIMA)]
Nicola Accarino, Maurizio Decina (Rome Univ.), and Claudio Rossi Jul. 1978 80 p refs In ITALIAN
(FUB-8-1978) Avail: NTIS HC A05/MF A01

Main procedures and controls used to guarantee correct data transmission in block commutation systems (especially in public data transmission networks) are described. Both aspects, Data Transfer Control (DTC) and Data Flow Control (DFC), are discussed. Author (ESA)

N79-26285# Fondazione Ugo Bordoni, Rome (Italy).
AUTOMATIC SPEAKER RECOGNITION: CONSIDERATIONS ON AN ADEQUATE METHODOLOGY TO SOLVE THE PROBLEM [RICONOSCIMENTO AUTOMATICO DEL PARLATORE: CONSIDERAZIONI SU UNA METODOLOGICA ATTA ALLA SOLUZIONE DEL PROBLEMA]
Giovanni Ibba and Andrea Paoloni Jul. 1978 21 p refs In ITALIAN
(FUB-10-1978) Avail: NTIS HC A02/MF A01

Some statistical considerations on the voice recognition problem was studied. No single parameter is sufficient, but results show a correlation function involving several parameters could be developed. Unfortunately there is not yet sufficient data on population distribution of these parameters. Suggestions for further work are presented. Author (ESA)

N79-26286# Fondazione Ugo Bordoni, Rome (Italy).
ERROR RATE ESTIMATION METHOD BASED ON THE DETECTION OF LINE CODING VIOLATIONS [METODOLOGIE DI STIMA DEL TASSO D'ERRORE BASATE SULLA RIVELAZIONE DELLE VIOLAZIONI DEI VINCOLI IMPOSTI DALLA CODIFICA DI LINEA]
Odoardo Brugia, Giovanni Campanini, Romolo Pietroiusti (SIP Direzione Gen.), and William Wolfowicz May 1978 58 p refs In ITALIAN
(FUB-11-1978) Avail: NTIS HC A04/MF A01

An error estimation method based on counting violations of code rules was developed. Expressions for the method efficiency and estimation delay are given. The method based on measuring the digital running sum is more efficient when the actual error rate is low. For 1/1000 effective error, efficiency is near 1100 percent. The most efficient method involves measuring the digital terminal sum in the considered measuring interval. The average estimation delay diminishes with the actual error rate. Results obtained for several codes are shown.Author (ESA)

N79-26287# Fondazione Ugo Bordoni, Rome (Italy).
SUBJECTIVE SPEAKER RECOGNITION: STATISTICAL CONSIDERATION ON ATTAINABLE RESULTS SIGNIFICANCE [RICONOSCIMENTO SOGGETTIVO DEL PARLATORE: CONSIDERAZIONI STATISTICHE SULLA SIGNIFICATIVITA DEI RESULTATI OTTENIBILI]
Giovanni Ibba and Andrea Paoloni Aug. 1978 25 p refs In ITALIAN
(FUB-17-1978) Avail: NTIS HC A02/MF A01

The rules and statistical bases of subjective techniques for speaker recognition are explained. Experimental design and results showing the influence of some parameters such as frequency shift, signal to noise ratio, and frequency bonds are given. The experimental methodology described is considered a contribution to reliability of results. The masking effects of objective factors are also discussed. Author (ESA)

N79-26288# National Telecommunication Information Administration, Boulder, Colo. Inst. for Telecommunication Sciences.

AIRCRAFT OBSTRUCTION OF MICROWAVE LINKS Final Report
R. E. Skerjanec and R. W. Hubbard Jan. 1979 68 p refs Sponsored in part by Army Communciations-Electronics Engineering Installation Agency
(PB-292372/0; NTIA/REPORT-79/14) Avail: NTIS HC A04/MF A01 CSCL 17B

A limited measurement program at 8 GHz at Altanta and Chicago Airports was undertaken to determine if a condition existed that could cause excessive error rates on digital systems. Measurements were made of the received signal level together with the impulse response of the transmission medium. Measurement results indicate that during takeoff and landing, aircraft can cause signal level fades to 20 db. The impulse response measurements at Atlanta did not reveal any delayed or distorted pulses that would indicate excessive multipath and frequency selective fading. However, slight distortion from taxiing aircraft at Chicago was observed. GRA

N79-26289# National Bureau of Standards, Washington, D. C. Acoustical Engineering Div.
MICROPHONE WINDSCREEN PERFORMANCE Final Report
Robert N. Hosier and Paul R. Donavan Jan. 1979 85 p refs Sponsored in part by EPA, Washington, D. C.
(PB-292967/7; NBSIR-79-1599) Avail: NTIS HC A06/MF A01 CSCL 17B

Measurements were made of the wind-induced noise and acoustic insertion loss of ten microphone windscreens. Eight of these were reticulated polyester spheres of varying porosity. The other two were the metal cage type typically used in long term outdoor noise monitoring. The measurements were made under laboratory conditions for normal and grazing flow incidence at wind speeds up to 14 m/sec. The foam windscreens provided more wind-induced noise reduction than the cage windscreens; however, the cylindrical cage windscreen performed better than any of the foam windscreens for normal flow incidence. GRA

N79-26290# Office of Radiation Programs, Las Vegas, Nev. Electromagnetic Radiation Analysis Branch.
NEAR-FIELD RADIATION PROPERTIES OF SIMPLE LINEAR ANTENNAS WITH APPLICATIONS TO RADIOFREQUENCY HAZARDS AND BROADCASTING
Richard A. Tell Jun. 1978 51 p refs
(PB-292647/5; ORP/EAD-78/4) Avail: NTIS HC A04/MF A01 CSCL 09E

Analytical expressions for the electromagnetic field are used to compute electric and magnetic field strengths in the near-vicinity of dipole and monopole transmitting antennas. In particular the fields about a half-wave length dipole are mapped to illustrate the magnitude and wide variation on field intensity which occurs near the feed point, along the axis of the dipole, and about the tip of the radiating arms. These results are analyzed in terms of evaluating potential radiofrequency hazards which may exist extremely near dipole like broadcast antennas and the aspect of close proximity exposure of maintenance personnel is discussed. GRA

N79-26291# RCA Government Communications Systems, Camden, N. J.
EMS (ELECTRONIC MESSAGE SERVICE): SYSTEM DEFINITION AND EVALUATION. EXECUTIVE SUMMARY Report, May 1976 - Dec. 1978
31 Dec. 1978 79 p 2 Vol.
(Contract USPS-104239-76-X-1675)
(PB-292933/9) Avail: NTIS HC A05/MF A01 CSCL 17B

Electronic Message Service System for the United States Postal Service is defined. The system requirements design concept, cost projections and economic analysis over the growth of the system is discussed. The results show there are adequate technical solutions and attractive systems for Postal Electronic Message Services. GRA

N79-26292# RCA Government Communications Systems, Camden, N. J.
EMS (ELECTRONIC MESSAGE SERVICE): SYSTEM DEFINITION AND EVALUATION Final Report, May 1976 - Dec. 1978
31 Dec. 1978 197 p 2 Vol.
(Contract USPS-104230-76-X-1675)
(PB-292934/7) Avail: NTIS HC A09/MF A01 CSCL 17B

The potential capability of coping with anticipated increased mail volume, changing mail patterns, and of taking advantage of the expanding utilization of electronic technology within the business world was investigated. An Electronic Message Service system for the United States Postal Service is described. The results show there are adequate solutions and attractive systems for Postal Electronic Message Service. S.E.S.

33 ELECTRONICS AND ELECTRICAL ENGINEERING

Includes test equipment and maintainability; components, e.g., tunnel diodes and transistors; microminiaturization; and integrated circuitry.

For related information see also *60 Computer Operations and Hardware* and *76 Solid-State Physics*.

N79-26293 Georgia Inst. of Tech., Atlanta.
PROPAGATION OF NOISE IN THE FAR FIELD FROM ELECTRIC TRANSFORMERS Ph.D. Thesis
Pranab Saha 1979 151 p
Avail: Univ. Microfilms Order No. 7913850

A theory is described for predicting the far field sound radiation pattern of rectangularly shaped electric transformers for given surface vibrations. The acoustic pressure outside the transformer is expressed in terms of an integral over vibrational normal velocity along the surface with a kernel. This kernel is an approximation to the Green's function for a point source just outside the surface of a rigid body with the same shape as the transformer. The Green's function is found to be expressible using concepts and techniques related to the geometrical theory of diffraction. The resulting Green's function takes into account direct waves, reflected waves, and diffracted waves which are derived from uniformly valid asymptotic expressions for diffraction of point source generated waves by a semi-infinite right-angled rigid wedge. Dissert. Abstr.

N79-26294 Illinois Univ. at Urbana-Champaign.
A SINGULAR PERTURBATION APPROACH TO POWER SYSTEM DYNAMICS Ph.D. Thesis
John Jay Allemong 1978 219 p
Avail: Univ. Microfilms Order No. 7913370

Singular perturbation techniques were applied to linear and nonlinear models of a single machine infinite bus power system and a three machine power system. In the linear realm, a method is given for obtaining state and eigenvalue approximations by computing approximations to the block diagonal system which isolates the fast and slow dynamics. A growth of model method is also given for determining the slow and fast variables in the power system models. For the nonlinear systems, it was found that the zero-order approximation of the slow variables was inadequate because it did not account for a nonnegligible fast component which was present in these variables. A new and simple method was developed to correct the nonlinear zero-order approximations. Dissert. Abstr.

N79-26295 Arizona Univ., Tucson.
DESIGN AND ANALYSIS OF INTEGRATED ELECTROTHERMAL FILTERS Ph.D. Thesis
Manoon Aramrattana 1979 140 p
Avail: Univ. Microfilms Order No. 7912534

Electrothermal circuits (ETC) are integrated circuits which use to advantage the interaction between electrical and thermal properties of silicon. Two ETC configurations were analyzed and designed: namely, a chip with two geometrically orthogonal channels each with a single heater and differential sensor, and a chip with two thermally isolated channels each comprising differential heaters and sensors. A band pass filter was used to verify the feasibility of the designs. Dissert. Abstr.

N79-26296 State Univ. of New York at Buffalo.
NONLINEAR SYSTEM ANALYSIS IN BIPOLAR INTE-

GRATED CIRCUITS Ph.D. Thesis
Ta-Fang Fang 1979 256 p
Avail: Univ. Microfilms Order No. 7913878

Since analog bipolar integrated circuits (IC's) are important components in modern communication systems, the study of the Radio Frequency Interference (RFI) effects in bipolar IC amplifiers is an important subject for electromagnetic compatibility (EMC) engineering. The investigation focused on using the nonlinear circuit analysis program to predict RF demodulation effects in broadband bipolar IC amplifiers. Briefly, the audio frequency (AF) voltage at the IC amplifier output terminal caused by an amplitude modulated (AM) RF signal at the IC amplifier input terminal was calculated and compared to measured values. Two broadband IC amplifiers were investigated: (1) a cascode circuit using a CA3026 dual differential pair; and (2) a unity gain voltage follower circuit using a micron A741 operational amplifier. Dissert. Abstr.

N79-26297 Illinois Univ. at Urbana-Champaign, Urbana.
DEVELOPMENT OF LINEAR AND NONLINEAR MAGNETIC CIRCUIT MODELS FOR THE PREDICTION OF STEP MOTOR STATIC PERFORMANCE Ph.D. Thesis
Charles Henry Folkerts 1978 310 p
Avail: Univ. Microfilms Order No. 7913457

Step motors are currently designed by trial-and-error techniques and/or intuition, which can provide reliable design information only after many years of experience. Therefore, it was decided to develop methods of modeling step motors for the purposes of designing motors and predicting their static performance. Methods are developed and presented for modeling step motors by linear and nonlinear magnetic circuits. Dissert. Abstr.

N79-26298 State Univ. of New York at Buffalo.
GALLIUM ARSENIDE METAL SEMICONDUCTOR FIELD EFFECT TRANSISTOR FABRICATION BASED UPON THE PROCESSING OF AN INDIVIDUAL DIE Ph.D. Thesis
Lynn Fenton Fuller 1979 104 p
Avail: Univ. Microfilms Order No. 7913881

Procedures were developed for the fabrication of GaAs MESFETS based upon the processing of individual die typically 2.5 mm square rather than the entire wafer. Dicing the epitaxial wafer prior to GaAs MESFET fabrication is a practical way to reduce materials cost per project. The procedures were used to process several dice. On each die four 6 micron gate length GaAs MESFETs were fabricated. One specific process variation which was probed was selected epitaxial layer etching prior to gate deposition. Edge bead problems associated with photoresist spin coating of the die were reduced by introducing vibration during spinning and careful die orientation with respect to the spin axis. Dissert. Abstr.

N79-26299 Florida Univ., Gainesville.
IMPROVEMENTS IN HIGH INJECTION TRANSISTOR NOISE THEORY AND MODELS Ph.D. Thesis
Clarence Lee Gardner 1978 117 p
Avail: Univ. Microfilms Order No. 7913274

High injection transistor noise theory and models that more closely agree with experimental results and allow accurate high injection predictions from low injection experiment are shown. The theory and models show that the hole concentration at the collector edge of base region could be a significant factor at low frequencies and thus could account for the large correlation impedance seen in experiments. At high frequencies it is necessary to account for electron and hole contribution to base noise current. Theory and models are developed which account for both. From Shockley's Basic Component current density equations, a high injection, low frequency equivalent circuit is developed which shows that in the absence of avalanche multiplication in the collector space-charge region (to keep the base current zero), the high injection factor B and diffusion factor m are not present. Dissert. Abstr.

N79-26300 Stanford Univ., Calif.
SILICON OXIDE STUDIES: PHYSICAL MODELING AND DEVICE APPLICATIONS OF THERMAL OXIDATION OF HEAVILY DOPED SILICON Ph.D. Thesis
Charles Pang-Hsin Ho 1979 183 p
Avail: Univ. Microfilms Order No. 7912371

Experimental characterization indicates that heavy phosphorus doping of silicon increases the oxidation rate primarily through enhancement of the reaction that converts Si to SiO2 at the oxide/silicon interface. Consideration of the strain and volumetric requirements inherent in the Si/SiO2 lattice mismatch suggests that silicon point-defect streams may be critically involved in this reaction. Consequently, the principal impact of heavy doping on the interface oxidation reaction is believed to be electrical. Point-defect streams may also be crucial in the overall oxidation process and may link oxide growth to oxide charges, oxidation-enhanced diffusion, and oxidation-induced stacking faults. Applications of the enhanced-oxidation phenomenon to metal-gate NMOS and DMOS devices are described. Dissert. Abstr.

N79-26301 California Univ., Los Angeles.
THEORY OF CHARGE PUMPING IN MOS TRANSISTORS Ph.D. Thesis
Ravindhar Kumar Kaw 1979 205 p
Avail: Univ. Microfilms Order No. 7913734

The charge pumping phenomena in MOS transistors was investigated. The phenomena was theoretically analyzed and shown to be strongly influenced by a dynamic process of charging and discharging of surface states. It is shown that surface states are not in equilibrium with the channel and the charging of the surface states is strongly influenced by the pumping frequency and the pulse characteristics. The theoretical model is based on both capture and emission of either electrons or holes by all the surface states. All the data was used to calculate the theoretical charge pumping current for a given pulsewidth, pulse repetition frequency, pulse peak and base voltages and transition times. The theoretical analysis was verified by experiments made on P-channel devices as well as P and N channel devices on a CMOS chip. Dissert. Abstr.

N79-26302 California Univ., Los Angeles.
EFFECTS OF SURFACE STATES ON THE LOW FREQUENCY TRANSFER INEFFICIENCY IN CCD'S Ph.D. Thesis
Conrad Jose Koeneke 1979 169 p
Avail: Univ. Microfilms Order No. 7913738

Solving the Shockley-Read-Hall rate equation for the occupancy of the surface states during a storage-transfer cycle, a general expression for the charge removed by the surface states from a charge packet was obtained. The surface density of charge lost from the charge packet is expressed as an integral over the energy of the surface state density between two limiting values of energy. Charge Transfer Inefficiency (CTI) measurements at different frequencies were made using a two phase Polysilicon gate Surface Channel CCD, (SCCD). In order to evaluate the area of the interface covered, CTI versus stored charge measurements with no background charge and at constant frequency were made. Two techniques were applied in order to scan the frequency range. Two devices showing different surface state characteristics were analyzed. Dissert. Abstr.

N79-26303 Illinois Univ. at Urbana-Champaign, Urbana.
ATOMIC AND ELECTRICAL PROFILE STUDIES OF ION-IMPLANTED SEMICONDUCTORS Ph.D. Thesis
Gerald Twiggs Marcyk 1978 124 p
Avail: Univ. Microfilms Order No. 7913542

The distribution of ion-implanted impurities in semiconductors was studied using atomic and electrical profiling techniques. The atomic profiles were obtained by Glow Discharge Optical Spectroscopy (GDOS). The GDOS technique, experimental system, and elemental sensitivity are discussed in detail. The impurity distributions of arsenic-implanted silicon and germanium-implanted gallium arsenide were investigated. The electrical profiles were obtained using Hall measurements in conjunction with successive layer removal. Germanium implantation was used to produce either p and n-type layers to form GaAs p-n junction diodes. The I-V characteristics of several implanted devices are presented. High quality diodes can be fabricated using a 10 to the 15th power/sq cm dose annealed at 800 C. Dissert. Abstr.

N79-26304 State Univ. of New York at Buffalo.
VACUUM ARC SWITCHED INVERTERS Ph.D. Thesis
Richard Neal Miller 1979 110 p
Avail: Univ. Microfilms Order No. 7913910

The theory of operation of high frequency, high power vacuum arc switched series inverters is discussed, and two models of the inverter are derived. Laboratory tests of the inverter are described and the two models are compared in their ability to describe inverter operation with actual inverter data obtained from the tests. The problems involved in achieving high power, high frequency operation of the vacuum arc switched series inverter are described and analyzed, especially the problems encountered in controlling the ignition of the vacuum arc switches. The construction and operation of a high power test facility to be used for testing the vacuum arc switched inverter is presented. Dissert. Abstr.

N79-26305 Washington Univ., Seattle.
FRESNEL ZONE LENS FABRICATED BY ELECTRON BEAM LITHOGRAPHY IN THIN FILM WAVEGUIDE Ph.D. Thesis
Paul Raymond Ashley 1978 187 p
Avail: Univ. Microfilms Order No. 7913343

The demonstration and analysis of the first Fresnel lens in a thin film waveguide is described. Both CeO phase shift and carbon absorption lenses are considered. A theoretical analysis of the relative intensity distribution in the focal plane of the Fresnel lens indicated that the lens is diffraction limited for all F-numbers. A theoretical evaluation of the efficiency of the lens for off normal incidence and for varying lens length of a phase shift lens was performed based on a model for radiation loss at zone boundaries. Results indicate good agreement with experiment over the range of data available. The fabrication techniques and materials of both phase shift and absorption lenses were examined. Single mode surface deposited phase shift lenses of CeO on a BaO waveguide resulted in highest efficiency and highest S/N ratio of all lenses used. Dissert. Abstr.

N79-26306 South Carolina Univ., Columbia.
COMPUTER-AIDED DESIGN OF MICROWAVE INTEGRATED PARAMETRIC AMPLIFIERS Ph.D. Thesis
Bangjuh Tseng 1978 195 p
Avail: Univ. Microfilms Order No. 7911862

The feasibility of designing microwave parametric amplifiers by computer-aided optimization techniques is investigated, with special emphasis placed upon amplifiers in microwave integrated circuit form. The diode package is an inevitable component of most microwave semiconductor devices. Circuit elements and diode parameters are determined from measured impedance data by employing a computer-aided optimization technique. Generalized expressions of gain and noise figure are derived for parametric amplifiers. Electrical characteristics of microstrip transmission lines are investigated. Analysis and synthesis methods for parallel couple microstrip band-pass filters are presented. An experimental 5.5 GHz degenerate amplifier was constructed. Dissert. Abstr.

N79-26307 Illinois Univ. at Urbana-Champaign.
A DYNAMIC CROSSED-FIELD PHOTOMULTIPLIER WITH AN ELECTRON BOMBARDED SEMICONDUCTOR COLLECTOR Ph.D. Thesis
Samuel Grandford White, Jr. 1978 98 p
Avail: Univ. Microfilms Order No. 7913650

An Electron Bombarded Semiconductor (EBS), used as a collector in a Dynamic Crossed-Field Photomultiplier (DCFP) as a means of increasing the magnitude of the DCFP output signal and thereby eliminating the requirement for post detection electronics, was investigated. The EBS collector placement in the electron path was determined by solving the Lorentz force equation for electrons in the focusing and acceleration regions of the device. The EBS was experimentally characterized by bombarding the collector with electrons of known energies. An experimental program was set up whereby the feasibility of an EBS collector was established. Dissert. Abstr.

N79-26308 Illinois Inst. of Tech., Chicago.
SIMULTANEOUS REALIZATION OF INPUT AND TRANSFER IMPEDANCES IN RC LADDER NETWORKS Ph.D. Thesis
Raymond Anthony Zalewski 1978 506 p
Avail: Univ. Microfilms Order No. 7913110

A derivation and synthesis technique is presented which allows an RC ladder network to be constructed which realizes exactly a predetermined Z sub 11 and Z sub 12. The technique allows the numerator zeros of Z sub 12 to be realized in any order. Also, a new simple method is presented for finding the maximum realizable value of the gain constant, G sub 12, which multiples Z sub 12. Dissert. Abstr.

N79-26309 Rensselaer Polytechnic Inst., Troy, N. Y.
CORONA PERFORMANCE OF TOROIDAL ELECTRODES FOR HIGH VOLTAGE EQUIPMENT Ph.D. Thesis
Ali Nourai 1978 242 p
Avail: Univ. Microfilms Order No. 7913084

Electrodes composed on one or more toroids are used as electrostatic shields for high voltage equipment. A satisfactory design of these shields for ultra high voltage (UHV) requires the control of audible and radio noise produced in wet weather. A computer program was developed that evaluates the electric fields of toroids. It also estimates the wet weather audible and radio noise levels on the basis of results obtained from tests on simple and composite toroids. Some empirical relations and graphs are also given for quick reference. Dissert. Abstr.

N79-26310 Illinois Inst. of Tech., Chicago.
ADAPTIVE DELTA MODULATION: DIGITAL FILTERING AND THE EFFECTS OF RANDOM CHANNEL ERRORS Ph.D. Thesis
Dimitrios Panos Prezas 1978 89 p
Avail: Univ. Microfilms Order No. 7913106

A digital system which directly filters a delta modulation (DM) encoded signal is presented. It is possible to operate directly on the DM bit stream, without first decoding, and obtain a filtered version of the original signal. A mathematical model, equivalent to the physical operation of filtering, was developed. This system can be realized, for any type of specified filter, and for either linear or adaptive DM encoded signals. The effects of random channel errors when the transmitted signal is in adaptive DM (ADM) format are described. Based on the characteristics of an all digital ADM, a mathematical model was developed which describes how the decoded signal is effected by channel noise. The net effect of a bit error is a scaling of the ADM estimate signal. Dissert. Abstr.

N79-26311*# National Aeronautics and Space Administration. Pasadena Office, Calif.
LOW CURRENT LINEARIZATION OF MAGNETIC AMPLIFIER FOR dc TRANSFORMER Patent Application
Satoshi Nagano, inventor (to NASA) (JPL) Filed 22 Jun. 1979 15 p
(Contract NAS7-100)
(NASA-Case-NPO-14617-1; US-Patent-Appl-SN-051269) Avail: NTIS HC A02/MF A01 CSCL 09C

A magnetic amplifier, having two saturable reactor cores with a separate excitation winding on each connected in series opposition, a common control winding, and a common output winding, was adapted for use as a low level signal transducer by exciting the separate excitation windings in push-pull mode through a center tapped transformer. Also, at least one diode in series with a load resistor connected to the output winding was included. A resistor in series with the output winding and load resistor was connected between the center tap of the transformer and the connection between the two excitation windings of the saturable core providing a return current path for the output winding. It also allows the excitation windings of the saturable cores to operate as primary windings of transformers. NASA

N79-26312*# National Aeronautics and Space Administration. Pasadena Office, Calif.
PUSH-PULL CONVERTER WITH ENERGY SAVING CIRCUIT FOR PROTECTING SWITCHING TRANSISTORS FROM PEAK POWER STRESS Patent Application
W. T. McLyman, inventor (to NASA) (JPL) Filed 22 Jun. 1979 15 p
(Contract NAS7-100)
(NASA-Case-NPO-14316-1; US-Patent-Appl-SN-051276) Avail: NTIS HC A02/MF A01 CSCL 09C

In a push-pull converter, switching transistors are protected from peak power stresses by a separate snubber circuit in parallel with each comprising a capacitor and an inductor in series, and a diode in parallel with the inductor. The diode is connected to conduct current of the same polarity as the base-emitter junction

of the transistor so that energy stored in the capacitor while the transistor is switched off, to protect it against peak power stress, discharges through the inductor when the transistor is turned on, and after the capacitor is discharged the energy now stored in the inductor discharges through the diode. To return this energy to the power supply, or to utilize this energy in some external circuit, the inductor may be replaced by a transformer having its secondary winding connected to the power supply or to the external circuit. NASA

N79-26313# Aerospace Corp., El Segundo, Calif.
TRANSIENT RADIATION AND DOSE-ENHANCEMENT EFFECTS IN TRANSISTORS Interim Report
G. Marshall Molen, Melvin J. Bernstein, Kenneth W. Paschen, and Robert H. Vandre 22 Aug. 1978 34 p refs
(Contract F04701-77-C-0078)
(AD-A067629; TR-0078(3950-04)-4; SAMSO-TR-78-108) Avail: NTIS HC A03/MF A01 CSCL 09/1

The response of bipolar transistors to ionizing radiation is considered for a relatively soft X-ray spectrum. A plasma focus device was used to irradiate several silicon transistors under controlled conditions so that the relative contributions to the radiation response could be isolated. The photocurrent response resulting from direct photon interaction with the silicon chip was in agreement with computations made on the basis of device geometry; however, contributions from packing effects were less predictable. The high Z package resulted in a nonuniform dose deposition in the device. The resultant dose enhancement is compared with integrated depth-dose profiles calculated with a Monte Carlo electron transport code. Author

N79-26314*# Hughes Aircraft Co., Culver City, Calif. Technology Support Div.
ELECTRICAL CHARACTERIZATION OF STANDARD AND RADIATION-HARDENED RCA CDP1856D 4-BIT, CMOS, BUS BUFFER/SEPARATOR Final Report
R. L. Stokes Jun. 1979 74 p Sponsored by NASA Prepared for JPL
(Contract JPL-954816)
(NASA-CR-158725; FR79-76-871) Avail: NTIS HC A04/MF A01 CSCL 09C

Tests performed to determine accuracy and efficiency of bus separators used in microprocessors are presented. Functional, AC parametric, and DC parametric tests were performed in a Tektronix S-3260 automated test system. All the devices passed the functional tests and yielded nominal values in the parametric test. M.M.M.

N79-26315*# Hughes Aircraft Co., Culver City, Calif. Technology Support Div.
ELECTRICAL CHARACTERIZATION OF HUGHES HCMP 1853D AND RCA CDP1853D N-BIT, CMOS, 1-OF-8 DECODER MICROCIRCUITS Final Report
R. L. Stokes Jun. 1979 59 p Sponsored by NASA Prepared for JPL
(Contract JPL-954816)
(HAC-Ref-E0963; FR79-76-870) Avail: NTIS HC A04/MF A01 CSCL 09C

Electrical characterization tests were performed on two different manufactured types of integrated circuits. The devices were subjected to functional and AC and DC parametric tests at ambient temperatures of -55 C, -20 C, 25 C, 85 C, and 125 C. The data were analyzed and tabulated to show the effect of operating conditions on performance and to indicate parameter deviations among devices in each group. Accuracy was given precedence over test time efficiency where practical, and tests were designed to measure worst case performance. R.E.S.

N79-26316*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
PERFORMANCE OF A 14.9-kW LAMINATED-FRAME dc SERIES MOTOR WITH CHOPPER CONTROLLER
John R. Schwab Jun. 1979 41 p refs Prepared for DOE
(Contract EC-77-A-31-1044)
(NASA-TM-79177; DOE/NASA/1044-79/2) Avail: NTIS HC A03/MF A01 CSCL 09A

Traction motor using two types of excitation: ripple free dc from a motor generator set for baseline data and chopped dc as supplied by a battery and chopper controller was tested. For the same average values of input voltage and current, the power output was independent of the type of excitation. At the same speeds, motor efficiency at low power output (corresponding to low duty cycle of the controller) was 5 to 10 percentage points less on chopped dc than on ripple-free dc. This illustrates that for chopped waveforms, it is incorrect to calculate input power as the product of average voltage and average current. Locked-rotor torque, no load losses, and magnetic saturation data were so determined. S.E.S.

N79-26317# Aerospace Corp., El Segundo, Calif. Aerophysics Lab.
IMPROVED CAMERA-TUBE PERFORMANCE WITH PULSED OPERATION Interim Report
Edward F. Cross and Joseph M. Narduzzi 27 Feb. 1979 33 p refs
(AD-A067336; TR-0079(4920)-1; SAMSO-TR-79-21) Avail: NTIS HC A03/MF A01 CSCL 09/5

A new electronic technique is discussed for improving the performance of a wide range of camera tubes (vidicons). Specifically, this technique significantly increases vidicon sensitivity by synchronously controlling the sensing-layer bias. Operational principles governing this new technique are explained in terms of the standard physical model that describes vidicon performance. The two pulsed operation methods discussed in this paper are referred to as the integrated-saturation and discharge modes. The video-signal enhancement is achieved in real time without requiring any computer-signal processing or additional data-reduction circuitry. Two other noteworthy features of this electronic technique are that image enhancement can be achieved without detrimentally affecting other tube parameters and be monitored with standard television equipment. The video enhancement anticipated with this synchronous pulse technique was verified experimentally. Four types of different camera tubes were tested in both the integrated-saturation and discharge pulsed modes. The results also indicated that dynamic range, in most cases, increased by approximately 50% while other vidicon transfer characteristics remained unaffected by pulsed mode operations. GRA

N79-26318# Raytheon Co., Bedford, Mass.
PRELIDDING BURN-IN EVALUATION Final Technical Report, 23 Oct. 1976 - 31 Mar. 1978
James R. DiNitto and Klaus B. Lasch Griffiss AFB, N. Y. RADC Jan. 1979 112 p
(Contract F30602-77-C-0004; AF Proj. 2338)
(AD-A067224; RADC-TR-78-267) Avail: NTIS HC A06/MF A01 CSCL 09/5

Screening of hybrid circuits is designed to identify and eliminate early electrical failures. Rework of these failures is complicated by the fact that the hybrids are sealed. This evaluation was designed to determine whether or not it is feasible to perform part of the burn-in portion of the screening sequence prior to package sealing. A hybrid circuit was designed to incorporate a wide range of components and materials and to permit access to points internal to the circuit for parametric shift detection. A test plan was devised to assess the efficiency of performing prelid burn-in under various conditions and to verify that no long term deleterious effects were introduced. Results of this evaluation have shown that prelidding burn-in is effective and is non-destructive. It should be performed in a dry nitrogen, Class 10,000 maximum, environment at 125 C for 48 hours. Sealed lid burn-in should be performed after prelidding burn-in at 125 C. Total minimum burn-in time of 160 hours at 125 C can be divided between prelidding and sealed lid burn-in provided that the total burn-in time equals or exceeds the specified 160 hour burn-in time equals or exceeds 96 hours. GRA

N79-26319# Edgerton, Germeshausen and Grier, Inc., Salem, Mass.
HIGH VOLTAGE, LOW INDUCTANCE HYDROGEN THYRATRON STUDY PROGRAM Final Report, 1 Oct. 1977 - 30 Sep. 1978
Robert F. Caristi and David V. Turnquist Mar. 1979 88 p refs
(Contract DAAB07-77-C-2725)
(AD-A067178; DELET-TR-77-2725-F) Avail: NTIS

HC A05/MF A01 CSCL 09/1

This report documents the results of a twelve-month study program directed toward gaining the information necessary to fabricate a high voltage, low inductance hydrogen thyratron switch capable of operating with a peak forward anode voltage of 250 kV, a peak forward anode current of 20 to 40 kA for 60 ns, and a current risetime of 10 to 20 ns. Operation under these conditions is ultimately required at high pulse repetition rates. The principal conclusion is that thyratron operation at 250 kV and 40 kA with a current risetime of a few tens of nanoseconds is a feasible proposition. However, the development of a tube having such capabilities is subject to the practical limits that are imposed by the breakdown characteristics of the ceramic insulators that are universally used in the construction of high power tubes. Operation at appreciable repetition rates is clearly subject to the ability of the tube to withstand the heating that results from operation at high average current and high di/dt. During the first phase of a multi-phase program, the emphasis of the work was placed on those factors that affect the voltage-inductance compromise, since it was determined that the tube's inductance (and not its commutation time) would dominate the maximum achievable di/dt. GRA

N79-26320# Hydrotronics, Inc., San Diego, Calif.
A DETERMINATION OF THE FIRST TWO MOMENTS OF THE ALE OUTPUT DETECTOR Final Report, Jul. - Sep. 1978
M. Shensa 30 Nov. 1978 39 p refs
(Contract N00123-76-C-1937; XF11101100)
(AD-A067213; NOSC/TR-330) Avail: NTIS HC A03/MF A01 CSCL 09/3

This report deals with a computation of the first two moments of the output distribution of the adaptive line enhancer (ALE) detector. Its primary motivation is to provide a means of determining the detection characteristics of the integrated spectral output. Previous results have relied on assumptions regarding the output statistics themselves; i.e., that they be chi-square distributions. In this work, only two assumptions are made: that the input to the detector be a sinusoid in white Gaussian noise and that the discrete Fourier transform (DFT) length and ALE filter length be considerably smaller than tau, the adaptive time constant of the ALE filter. Author (GRA)

N79-26321# Naval Ocean Systems Center, San Diego, Calif.
LOW COST COMPONENTS: SELECTION AND ACQUISITION OF MICROELECTRONIC DEVICES Final Report, May 1977 - Sep. 1978
J. H. Townsend 15 Feb. 1979 50 p refs
(AD-A067667; NOSC/TD-223) Avail: NTIS HC A03/MF A01 CSCL 09/1

Low Cost Components is an acquisition research project addressing microelectronic devices. The goal is to improve reliability and reduce costs associated with components, especially microcircuits. Microcircuits are high-lighted because they are subject to common problems with other component types plus the problems associated with a rapidly evolving technology. Guidance is provided for the selection and screening of microelectronic devices. The project implements findings and recommendations from the TELCAM II project, reported in Naval Electronics Laboratory Center (NELC) TR 1957. Author (GRA)

N79-26322# General Electric Co., Syracuse, N.Y. Heavy Military Equipment Dept.
AN ITERATIVE INTERPOLATION TECHNIQUE USING FINITE IMPULSE RESPONSE DIGITAL FILTERS
J. P. Costas Feb. 1979 105 p refs
(AD-A067511; R79EMH1) Avail: NTIS HC A06/MF A01 CSCL 09/3

Interpolation operations have wide applications in signal processing systems. An efficient interpolation technique is developed and demonstrated. This is an iterative technique in which interpolation output at any stage is combined with the input to that stage so that the interleaved result forms the input to the succeeding stage. Sampling rate increases of high order are not difficult to achieve. Resampling of high-order interpolator outputs permits precise control of sampling rate conversion ratios. From this basic work in interpolation, a digital filter synthesis procedure is developed. The resulting class of finite impulse response filters is competitive in speed and storage with conventional designs. These filters have the property that the passband frequency function of a generic design can be scaled by any desired factor in frequency while maintainng stopband suppression to specified levels. This synthesis procedure uses a 'stretch-and-fill' iteration operation. The impulse response into a synthesis stage is stretched, and the vacated spaces are then filled from new data synthesized at that stage. The 'stretch' performs the frequency scaling function while the 'fill' operation eliminates image responses that would otherwise appear. Computation of the coefficients for these filters, of any order, is trivial. A FORTRAN computer program which uses the developed algorithm is provided for general interpolation service. Auxiliary use of this program for obtaining derived filter coefficients is described, and examples of filter synthesis are given. Special entry points are provided for data format mode conversion: complex-to-real and real-to-complex. Equivalent procedures for sampling rate reduction are also presented and discussed. GRA

N79-26323# Illinois Univ. at Urbana-Champaign. Electromagnetics Lab.
SOURCE EXCITATION OF AN OPEN, PARALLEL-PLATE WAVEGUIDE. NUMERICAL RESULTS Interim Report
V. Krichevsky Aug. 1978 58 p ref
(Grant AF-AFOSR-76-3066)
(AD-A067787; UIEM-78-4; UILU-ENG-78-2546; AFOSR-79-0431TR) Avail: NTIS HC A04/MF A01 CSCL 09/5

In this work we investigate numerically the problem of the source excitation of an open, parallel-plate waveguide. The following assumptions are made for the source current: (1) the current is oriented in the y-direction, (2) it is located at x = 0, (3) there is no variation in the y-direction, and (4) the current has exp (i beta z) behavior along the longitudinal z-direction. We provide graphical output for the EM-field components as functions of a longitudinal propagation constant and transverse coordinates and then discuss these results. Author (GRA)

N79-26324# TRW Defense and Space Systems Group, Redondo Beach, Calif.
DEVICE TECHNOLOGY FOR HIGH PERFORMANCE MONOLITHIC SAMPLE-AND-HOLD CIRCUITS Final Report, May - Aug. 1978
Alan S. Templin and Leon W. Hobrock Oct. 1978 78 p refs
(Contract F33615-77-C-1155)
(AD-A067786; AFAL-TR-78-160) Avail: NTIS HC A05/MF A01 CSCL 09/5

Development of devices for a monolithic sample and hold on a single chip was undertaken. Process developments were conducted to incorporate a p channel JFET and Schottky diodes into a high speed monolithic process. A test chip was designed and evaluated. The chip included test devices, test circuits and a complete sample-and-hold. The test results indicated that the devices were acceptable for sample and hold circuits. The test results of the sample and hold indicated 7 bit performance at sample rates of up to 50 Msps. Author (GRA)

N79-26325# Hydrotronics, Inc., San Diego, Calif.
EXPERIMENTAL PERFORMANCE MEASUREMENTS OF ADAPTIVE NOISE CANCELLER (ANC): VARIOUS INPUTS AND INTERNAL PARAMETERS CORRESPOND WITH EXISTING THEORY Final Report, Oct. 1977 - Jun. 1978
R. H. Hearn Sep. 1978 47 p refs
(Contract N00123-76-C-1937)
(AD-A067977; NOSC/TR-372) Avail: NTIS HC A03/MF A01 CSCL 09/3

This report describes tests performed on the Adaptive Noise Canceller (ANC) as part of a joint NUSC/NOSC program investigating adaptive processers. The purpose of the test was to evaluate the effects of various inputs and internal parameters on the operating characteristics of the ANC. The primary dependent parameters of interest were the adpative time constant, the notch width, and notch depth. These were measured as functions of the filter length, feedback constant, reference power spectrum and delay. The number of reference inputs was varied as well. The experimental results are plotted and show excellent agreement with existing theory.
Author (GRA)

N79-26326# Varian Associates, Palo Alto, Calif.
AN INVESTIGATION OF POWER SUCK-OUT IN HELIX TRAVELING WAVE TUBES Final Report
David Pryor Hinson Dec. 1978 100 p refs Prepared in cooperation with Watkins-Johnson Co., Palo Alto, Calif.
(Contract F49620-77-C-0102; AF Proj. 2305)
(AD-A067916; AFOSR-79-0392TR) Avail: NTIS HC A05/MF A01 CSCL 09/1

This report describes the results of an experimental investigation of power suck-out in high power single helix traveling-wave amplifiers. The objective here is to perform a variety of measurements which thoroughly and systematically characterize the phenomenon in one particular tube type. The resulting description of power suck-out provides a firm basis for a theoretical solution, and indicates design considerations which may reduce its effects. In particular, the results establish a relationship between the power holes and the output helix stop band at pi radians phase shift per helix turn, and suggest in interpretation of the interaction which causes power suck-out. Author (GRA)

N79-26327# RCA Advanced Technology Labs., Camden, N. J.
RADIATION HARDENED CMOS/SOS CODE GENERATOR FOR SPACE APPLICATIONS Final Report
J. I. Pridgen and H. W. Kaiser Oct. 1978 108 p refs
(Contract N00014-75-C-0709)
(AD-A067980) Avail: NTIS HC A06/MF A01 CSCL 09/5

The primary objective of this program was to design, fabricate, and test a radiation hardened LSI code generator array suitable for use in the NAVSTAR Global Positioning System (GPS). The LSI array developed is a mask programmable custom cell CMOS/SOS array which was fabricated using both standard processing and radiation hardened processing. Designated TCS102, this array contains two 12-stage pseudorandom sequence generators and a 12-stage synchronous counter along with associated control logic. The Precision (P) Code Generator in the GPS operates with a fixed 10.23-MHz clock. The radiation hardness objectives for this development effort were a total dose hardness of 1 million rads(Si), with a minimum transient upset level of 2 x 10 to the 10th power rads(Si)/s, with a goal of 10 to the 11th power rads(Si)/s. Extensive computer simulations were made to predict circuit performance over the full range of total dose radiation and ambient temperature to -125 C. Design techniques used to obtain high speed include: the elimination of long signal paths, retiming of all control signals on the array, optimizing device widths for maximum speed, and designing all devices with a channel length of 6.25 micrometers. Radiation hardening techniques included: clamped channels on P transistors, elimination of transmission gates from the design, use of gated diodes for the input protection, and restriction of stacked devices to a maximum of three. GRA

N79-26328# RCA Corp., Lancaster, Pa. SSD-Electro-Optics and Devices.
MANUFACTURING METHODS AND TECHNOLOGY MEASURE FOR FABRICATION OF SILICON TRANSCALENT RECTIFIER Interim Report, 30 Jun. - 30 Dec. 1978
B. B. Adams, M. F. DeVito, S. W. Kessler, W. L. Krown, and R. E. Reed Jan. 1979 83 p refs
(Contract DAAK70-78-C-0120)
(AD-A067880) Avail: NTIS HC A05/MF A01 CSCL 09/5

RCA has successfully completed the fabrication and testing of the five engineering sample devices under this contract. This report thoroughly describes and discusses the assembly and process procedures; test circuits and test results; and configuration management procedure. It also includes numerous detailed drawings and graphs to further illustrate the ingenuity of this Silicon Transcalent Rectifier. Author (GRA)

N79-26329# Ames Lab., Iowa.
DESIGN OF rf POWER AMPLIFIERS (HIGH AND LOW Q) AND LUMPED EQUIVALENT CIRCUITS OF TRANSMISSION LINES WITH NMR APPLICATIONS
Paul D. Murphy and B. C. Gerstein Dec. 1978 30 p refs
(Contract W-7405-eng-82)
(IS-4596) Avail: NTIS HC A03/MF A01

The designs of high Q and low Q linear, rf power amplifiers at 56.0 MHz are presented. These amplifiers were used in double resonance and multiple pulse NMR experiments. The design of lumped equivalent circuits of transmission lines was also discussed. These circuits were shown to possess desirable properties especially in NMR double resonance experiments. DOE

N79-26330# Brookhaven National Lab., Upton, N. Y.
PROPERTIES OF SUPERCONDUCTING Nb3Si
David Dew-Hughes 1978 5 p refs Presented at Applied Superconductivity Conf., Pittsburgh, 25-28 Sep. 1978
(Contract EY-76-C-02-0016)
(BNL-24949; Conf-780952-42) Avail: NTIS HC A02/MF A01

Superconducting Nb3Si was made by the explosive compression of the high temperature, equilibrium tetragonal Ti3P phase. The material has a broad superconducting transition with an onset T/sub c/ approximately 18K and midpoint approximately 16K. T/sub c/ is considerably reduced by fast neutron irradiation but can be partially recovered by annealing at 600 C. X-ray results are inconclusive but the new superconducting phase was identified as having the A15 structure with a lattice parameter approximately 5.12A. The upper critical field H/sub c2/(0) is disappointingly low at 15.5 to 17 tesla; this is, however, not inconsistent with highly degraded A15 material. DOE

N79-26331# Los Alamos Scientific Lab., N. Mex.
INITIATION AND PROPAGATION OF NORMAL ZONES IN A FORCE-COOLED TUBULAR SUPERCONDUCTOR
J. K. Hoffer 28 Sep. 1978 7 p refs Presented at Appl. Superconductivity Conf., Pittsburg, 25 Sep. 1978
(Contract W-7405-eng-36)
(LA-UR-78-2481; Conf-780952-30) Avail: NTIS HC A02/MF A01

A numerical analysis was performed on the time dependent equations of heat balance, gas convection, pressure drop, and mass-flow rate for supercritical helium gas flowing through a tubular superconductor. Three-dimensional graphs of wall temperature, gas temperature, and mass-flow rate as functions of position and time were used to show the evolution of normal zones. The analysis show that stability was influenced by both the magnitude and the time dependence of the disturbance. DOE

N79-26332# Sandia Labs., Livermore, Calif.
PRELIMINARY STUDIES OF MICROCHANNEL PLATE PHOTOMULTIPLIER TUBE NEUTRON DETECTORS FOR FLIGHT TEST APPLICATIONS
K. W. Dolan Oct. 1978 30 p refs
(Contract EY-76-C-04-0789)
(SAND-78-8266) Avail: NTIS HC A03/MF A01

Electrical, mechanical, thermal, and neutron response data indicated that that microchannel plate photomultiplier tubes were viable candidates as miniature, ruggedized neutron detectors for flight test applications in future weapon systems. DOE

N79-26333# Bendix Corp., Kansas City, Mo.
QUANTITATIVE COMPARISON OF ELECTRONIC COMPONENT-SOLDER JOINT STRESS RELIEF IN ENCAPSULATED ASSEMBLIES
D. A. Cummings Nov. 1978 26 p refs
(Contract EY-76-C-04-0613)
(BDX-613-1868-Rev) Avail: NTIS HC A03/MF A01

Component lead sleeving is the most effective method for stress relieving both component bodies and solder joints in encapsulated electronic assemblies. Silicone was the most effective sleeving found for reducing loads; however, it compares closely to heat shrinkable polyolifin sleeving in quantitative load tests run at ambient temperatures. DOE

N79-26334# Danish Research Center for Applied Electronics, Hoersholm.
TRANSIENT ATTENUATION OF POWER SUPPLIES: A THEORETICAL AND PRACTICAL EVALUATION OF A POWER SUPPLY'S ABILITY TO PREVENT COUPLING OF TRANSIENT FROM MAINS NETWORK INTO THE DC OUTPUT
J. DuvaldChristensen and P. Krebs Jul. 1978 132 p refs Sponsored jointly by Soc. for Reliability and Environ. Testing and Council of Technol.
(ECR-83) Avail: NTIS HC A07/MF A01; Elektronikcentralen,

Hoersholm, Den. D.Kr. 50

The EMC design for fundamentals of power supplies pertaining to the reduction of the common mode coupling of small risetime transients from the AC power distribution network to the DC bus are outlined. A test method for the evaluation of power supply transient attenuation for all realistic installation modes is described. The method is ideal for time saving experimental optimization as the attenuation is displayed in real time as a frequency domain representation. To illustrate the problems connected with common mode transient attenuation, measurements on a standard power supply designed at Elektronikcentralen were carried out. It was demonstrated by circuit calculations and by measurements that only one generally applicable method exists to achieve a large common mode transient attenuation. That is inserting a choke with a very large first resonance in series with all leads entering the power supply from the AC distribution network. Author (ESA)

N79-26335# Electricite de France, Paris. Div. Conversion Electrochimique.

PRESSURIZED WATER ELECTROLYSIS TEST CIRCUIT: INITIAL OPERATING RESULTS [BOUCLE D'ESSAIS D'ELECTROLYSE DE L'EAU SOUS PRESSION: PREMIERS RESULTATS D'EXPLOITATION]

Alain Damien and Jean-Claude Barre Feb. 1977 16 p In FRENCH

(P/539/77/12) Avail: NTIS HC A02/MF A01

Different components making up a pressurized circuit for water electrolysis were tested at 20 bars, at temperatures of 60C and 100C, in order to determine voltage to current density characteristics of independent electrolytic cells equipped with either activated or nonactivated electrodes. Problems encountered with the experimental setup are described and solutions are discussed. Results justify the construction of a pressurized circuit operating at 180 C, having horizontal seperators, a 12V-1500 amp power supply, and encompassing eight cells with the possibility of adding others if necessary. Author (ESA)

N79-26336# Laboratoire Central de Recherches Thomson-CSF, Orsay (France).

INTEGRATED MILLIMETER WAVES GENERATOR Final Report [SOURCES MILLIMETRIQUES INTEGREES]

J. Espaignol Dec. 1977 54 p refs In FRENCH Sponsored in part by Direc. des Rech., Etudes, et Tech. Original contains color illustrations

(Contract DRME-76/34-203)

(LCR-489-315) Avail: NTIS HC A04/MF A01

Reliable, easy to use integrated circuits for generating millimeter radio waves were developed and studied. Miniaturized components of simplified design, called preset modulators, made possible the integration of an avalanche diode with a radiating element. A signal frequency on the order of 50 GHz was obtained. Different semiconductor materials and improved manufacturing techniques for diodes were studied. Signal strength was greatly enhanced, better by an order of magnitude over a previous result of 50 milliwatts generated using classical circuits. The study indicates the advantages of unifying modulator design and manufacturing technologies now that the feasibility of extremely high frequency transmission directly into space has been demonstrated. Author (ESA)

N79-26337# Fondazione Ugo Bordoni, Rome (Italy).

COMMENTS ON REPEATER DISTANCE DIMENSIONING IN COAXIAL CABLE DIGITAL DATA TRANSMISSION [CONSIDERAZIONI SUL DIMENSIONAMENTO DELLA SEZIONE DI RIPETIZIONE NEI COLLEGAMENTI NUMERICI IN CAVO COASSIALE]

Odoardo Brugia, Domenico DeSeta, Wolfango Maggi, Claudio Rossi, and William Wolfowicz May 1977 19 p In ITALIAN

(FUB-26-1977) Avail: NTIS HC A02/MF A01

A mathematical model of the section between repeaters is described. This model simplifies repeater distance calculations. Jitter and impedance variations are not taken into account, while several simplifying hypotheses are included in the model. As a result, a set of charts is included giving, for different values of attenuation and binary frequency, the maximum gain and amplitude of the repeater as a function of length (km). Some examples illustrate pratical applications. Author (ESA)

N79-26338# Fondazione Ugo Bordoni, Rome (Italy).

ANALYSIS OF A MODEL FOR THE INTERPRETATION OF CHROMATIC DELAY IN LIGHT EMITTING DIODES [ANALISI DI UN MODELLO PER L'INTERPRETAZIONE DEL RITARDO CROMATICO NELL'EMISSIONE DI DIODI LUMINESCENTI]

Paolo Spano Dec. 1977 15 p refs In ITALIAN

(FUB-31-1977) Avail: NTIS HC A02/MF A01

An existing model explaining the chromatic delay in LEDs driven by sinusoidal signals was extended to pulse signals. The model shows no actual delay between parts of the optical spectrum, but a deformation of the optical pulse which is dependent on the wave-length. The amount of deformation also depends on the ratio of the minority carriers life-time in the photoluminescent zones to the minority carriers life-time in the electroluminescent zones, increasing with larger ratios. Author (ESA)

N79-26339# Consiglio Nazionale delle Ricerche, Frascati (Italy). Lab. di Ricerca e Technologia per lo Studio del Plasma nello Spazio.

LOW-NOISE PREAMPLIFIER FOR GRAVITATIONAL WAVE EXPERIMENTS

F. Bordoni, A. Ottaviano, and G. V. Pallottino Oct. 1978 29 p refs

(LPS-78-11) Avail: NTIS HC A03/MF A01

After a discussion of the main factors contributing to voltage and current noise from high quality field effect devices, the design of a low-noise preamplifier for gravitational wave experiments is discussed. Experimental results are presented that show a noise temperature of .16 K in the 1 to 10 kHz range. Some results are also given for the low temperature performance of a BF 817, with a noise temperature improvement of a factor of 2 in the optimum range 140 to 150 K. Author (ESA)

N79-26340# Fondazione Ugo Bordoni, Rome (Italy).

COMPUTATION OF THE EQUILIBRIUM POINTS IN AN ELECTRIC NETWORK WITH MANY MACHINES [CALCOLO DEI PUNTI DI EQUILIBRIO DI UNA RETE ELETTRICA A MOLTE MACCHINE]

Michele LaCava (Calabria Univ.), Cosmo Damiano LaCivita, and Salvatore Nicosia (Rome Univ.) Apr. 1978 41 p refs In ITALIAN

(FUB-2-1978) Avail: NTIS HC A03/MF A01

A multiple interconnected machine network, itself connected to an external network of infinite capacity, was studied. The differential equations were established assuming a third order model for each machine. The equilibrium points were identified by exploring several alternative methods. A procedure is suggested, based on the model, that requires less computing time, and has greater efficiency. A computer printout case is shown. Author (ESA)

N79-26341# Texas Instruments, Inc., Dallas.

TECHNIQUES FOR THE PREPARATION AND ANALYSIS OF STANDARD SILICON SEMICONDUCTOR SPECIMENS FOR THE ION MICROPROBE MASS ANALYZER Final Report

Graydon Larrabee and Robert Dobrott Jan. 1979 62 p refs

(Contract NBS-S-35917; ARPA Order 2397)

(PB-292806/7; TI-08-77-49; NBS-GCR-79-158) Avail: NTIS HC A04/MF A01 CSCL 14B

A technique was developed to prepare sodium-, phosphorus-, arsenic-, antimony-, and gold-doped silicon and silicon dioxide reference specimens using ion-implantation techniques. The implants were done in small islands or microdots of various sizes to simulate geometries encountered in semiconductor integrated circuits. The number of dopant atoms per unit area was determined by neutron activation analysis. The reference specimens were applied to methods development and calibration of the ion microprobe mass analyzer (IMMA). IMMA detection limits were experimentally determined. A model for experimentally determining the parameters governing detection limits was developed. GRA

N79-27065# Joint Publications Research Service, Arlington, Va.

INTEGRATED SYSTEMS: A MODERN TREND IN THE DEVELOPMENT OF AUTOMATED DESIGN SYSTEMS
M. A. Gavrilov *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 72 (JPRS-73663) 12 Jun. 1979 p 9-12 refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 1, Jan. 1979 p 3-4 (For primary document see N79-27064 17-99)
Copyright. Avail: NTIS HC A05/MF A01

34 FLUID MECHANICS AND HEAT TRANSFER

Includes boundary layers; hydrodynamics; fluidics; mass transfer; and ablation cooling.

For related information see also *02 Aerodynamics* and *77 Thermodynamics and Statistical Physics*.

N79-26342 Illinois Univ. at Urbana-Champaign.
INERTIAL PERTURBATIONS TO INERTIALESS MAGNETOHYDRODYNAMIC AND ROTATING FLOWS Ph.D. Thesis
Ali Mohamed El-Consul 1978 165 p
Avail: Univ. Microfilms Order No. 7913441

Starting with the asymptotic solutions for the inertialess flows, small inertia asymptotic expansions were constructed in order to include the largest possible inertial disturbances that were neglected in the inertialess approximation. For infinitely long ducts, inertial perturbations were found to decay faster with distance than the inertialess solutions in all the flow subregions for both types of flow and for all divergences considered. For the magnetohydrodynamic flows, the ratios of the first inertial perturbations to the corresponding inertialess solutions were found to decay more slowly as the divergence of the duct becomes smaller; while for the rotating flows, the reverse as true. Solutions for the first order terms in the small inertia asymptotic expansion were found in every flow carrying subregion of the duct. Dissert. Abstr.

N79-26343 Minnesota Univ., Minneapolis.
PREDICTION OF FLOW AND HEAT TRANSFER IN INTERNALLY FINNED TUBES Ph.D. Thesis
Mihajlo Ivanovic 1978 164 p
Avail: Univ. Microfilms Order No. 7912027

The analysis of fully developed turbulent flow and heat transfer in tubes with straight fins was presented using a special version of the mixing length model. The model takes account of the proximity of both fin surfaces and the tube wall as well as the gradients in the radial and circumferential direction. The adjustable constant in the model was determined after comparisons with experimental data for friction factor and Nusselt number. The numerical predictions were in good agreement with experimental results. The analysis of fully developed laminar flow and heat transfer in tubes with twisted fins consisted of a new computational technique based on the employment of a transformed coordinate system which follows the twisted fin. Due to the periodicity of the secondary flow, the set of finite difference equations were solved by employing cyclic tri-diagonal matrix algorithm.
Dissert. Abstr.

N79-26344 Illinois Univ. at Urbana-Champaign, Urbana.
UNSTEADY TURBULENT THERMAL CONVECTION Ph.D. Thesis
Rogerio Tadeu daSilva Ferreira 1978 234 p
Avail: Univ. Microfilms Order No. 7913452

A particular form of thermal convection in which a horizontal layer of water is confined between a heated lower plate and an insulated upper plate at large turbulent Reynolds number was studied. The emphasis is made on the structure of turbulent flows, especially measurements of the higher order moments and their relationship to lower order quantities. Measurements of the local, instantaneous values of the temperature, the vertical velocity and horizontal velocity were performed using a scanning thermocouple probe and a laser Doppler velocimeter. The various terms in the equations for kinetic energy, thermal variance and kinematic heat flux were calculated and flow visualization and conditional averaging techniques were employed to infer certain properties of the active fluid transport mechanisms. Power laws in a possible equilibrium layer were calculated and power spectrum estimates were used to evaluate the rate of dissipation functions when inertial subranges existed in the wave number space. Dissert. Abstr.

N79-26345 City Univ. of New York.
A NUMERICAL SOLUTION TECHNIQUE FOR THREE-DIMENSIONAL MULTIPARTICLE STOKES FLOWS Ph.D. Thesis
Peter Ganatos 1979 185 p
Avail: Univ. Microfilms Order No. 7913126

The hydrodynamic interaction between two or more closely spaced identical spheres in a plane is examined. The various two sphere configurations provide a convenient means of carefully testing the accuracy and convergence of the numerical solution technique for three dimensional flow with known exact spherical biopolar solutions. The collocation technique is extended to the treatment of three dimensional bounded Stokes flow problems with planar symmetry. In particular, a solution is presented for arbitrary slow motion of a sphere in a viscous fluid bounded by two plane parallel walls. The accuracy of the new technique is tested by detailed comparison with the exact solutions for the drag and torque on a sphere moving parallel or perpendicular to a single plane wall, rotating adjacent to the wall, or in the presence of a shear field. Dissert. Abstr.

N79-26346 Colorado School of Mines, Golden.
THE PREDICTION OF GEYSERING IN FLUID TRANSFER LINES BY FLOODING THEORY Ph.D. Thesis
John Elwyn Anderson 1978 69 p
Avail: Univ. Microfilms Order No. 7912210

The rapid expulsion of liquid from a fluid transfer line as a result of vapor generation within the line at a rate in excess of that which could be released by normal bubble buoyancy was investigated in varying lengths of transfer lines of 4 and 6 inch diameter using water and liquid nitrogen as test fluids. Testing was conducted on the transfer lines at orientation angles of 0 deg, 30 deg, and 60 deg from the vertical. Because of the similarity between geysering and mass transfer column flooding, a review of flooding analysis techniques was conducted to define possible analytical methods. From this review, a correlation for flooding in vertical tubes employing countercurrent liquid-vapor flow was identified. This correlation formed the basis for development of a geyser prediction model which was subsequently correlated with data from the experimental program.
Dissert. Abstr.

N79-26347 Illinois Inst. of Tech., Chicago.
FLUID MECHANICS OF HORIZONTAL AND VERTICAL LAMINAR NEWTONIAN JETS Ph.D. Thesis
Abdi Faghihi-Shiraz 1978 143 p
Avail: Univ. Microfilms Order No. 7913094

A coordinate transformation from cylindrical to Protean coordinates is utilized to fix the position of the free surface. A mapping is used to map the doubly infinite axial domain into a finite one to facilitate the generation of solutions by the finite difference method. A radial transformation is used to remove unbounded radial derivatives at the solid wall. An analytical asymptotic solution is derived for vertical jets for distances far from the nozzle. Horizontal jets expand for Re less than 15 and contract for Re greater than 15 with a 10% expansion in the limit of zero Re. The numerical solution near the nozzle and the asymptotic analytical solution far from the nozzle are matched for vertical jets. The jet core expands near the nozzle at all Re's and Fr's. Dissert. Abstr.

N79-26348 City Univ. of New York.
TURBULENT AND FAST FLUIDIZATION (HIGH VELOCITY FLUIDIZATION) Ph.D. Thesis
David Hartman Larson Turner 1979 85 p
Avail: Univ. Microfilms Order No. 7913172

The results of experiments conducted at room conditions in a two dimensional and a round I.D. bed, on the transition from bubbling to turbulent fluidization of several solids of different sizes and densities is presented. The fast fluidization characteristics of a fine cracking catalyst in a round 3 inch I.D. bed is discussed. The character and range of turbulent and fast fluid beds

(collectively called high velocity fluid beds) are explored. It was concluded that the transition from bubbling to turbulent fluidization is reflected in the fluctuations of both the dynamic pressure at any point in the bed and the pressure drop across the bed.
Dissert. Abstr.

N79-26349 Catholic Univ. of America, Washington, D. C.
A STUDY OF INFLOW CHARACTERISTICS IN A STRATIFIED FLUID Ph.D. Thesis
Yi Jen Lin 1978 164 p
Avail: Univ. Microfilms Order No. 7913365

A study was made of the horizontal surface discharge into an ambient body of water in a channel. The inflow densities were either lighter or heavier than that of the ambient, and the vertical density distributions of the ambient were either uniform or stratified. The experiments were designed to discover the relationship between the flow characteristics, such as current speed, frontogenesis, density and velocity distributions with an inflow densimetric Froude number and defined in an appropriate manner. Although emphasis was placed on the experimental aspect, a combined analytical, numerical and experimental approach was undertaken to achieve further understanding of the inflow dynamics. The numerical aspect was based on a nonlinear initial boundary value problem, using the full Navier-Stokes and diffusion equations. Dissert. Abstr.

N79-26350 Iowa Univ., Iowa City.
THREE-DIMENSIONAL BOUNDARY LAYERS ON BODIES OF REVOLUTION AT INCIDENCE Ph.D. Thesis
Do-Hyung Choi 1978 206 p
Avail: Univ. Microfilms Order No. 7912836

An experimental and theoretical study of the three-dimensional boundary layer on a body of revolution is reported. The experiments were performed in the turbulent boundary layer on a fuselage-shaped body. The data correspond to axisymmetric flow as well as the flow at an angle of incidence of 15 degrees, and include surface pressure distributions and the distribution of the magnitude and orientation of the velocity vector in the boundary layer. The results clearly exhibit most of the complexities encountered in practical three dimensional boundary layer flow situations, such as viscous-inviscid interaction, reversal of crossflow, open separation, and onset of longitudinal vortices. Dissert. Abstr.

N79-26351 Illinois Univ. at Urbana-Champaign.
STUDY OF SECOND ORDER TURBULENCE MODELS WITH VARIABLE COEFFICIENTS Ph.D. Thesis
Myung Kyoon Chung 1978 143 p
Avail: Univ. Microfilms Order No. 7913410

The rate of kinetic energy decay and the return-to-isotropy of turbulent flows are examined by analyzing existing data from simple turbulent flows in order to expand the range of applicability of the second-order closure technique. It is found that by allowing the model coefficients to vary according to local conditions, local anisotropy and/or Reynolds number, the second-order closure technique can reproduce satisfactorily the decay history of energy and partitioning of the stresses among the three components of velocity fluctuations. Empirical forms of such variable coefficients are formulated in terms of the local conditions, and the adequacy of these correlations are demonstrated by calculations of homogeneous turbulent flows. A universal scaling law for the turbulent thermal convection is proposed to formulate a universal mean temperature profile formula, whose agreement with experimental data is very satisfactory over the entire layer.
Dissert. Abstr.

N79-26352 Iowa Univ., Iowa City.
AN ANALYTICAL SOLUTION OF THE THICK AXISYMMETRIC TURBULENT BOUNDARY LAYER ON A LONG CYLINDER OF CONSTANT RADIUS Ph.D. Thesis
Nuray Denli 1978 104 p
Avail: Univ. Microfilms Order No. 7912843

Two similarity laws for a thick, axisymmetric, turbulent boundary layer on a long circular cylinder are established. The validity of the assumption of constant stress moment in the law of the wall region is analyzed under the assumption of similarity. A new logarithmic mixing length, which takes into consideration the effect of transverse curvature on turbulence, is proposed for the law of the wall region. With this logarithmic mixing length model, the mean flow momentum equation yields a law of the wall relation in terms of the exponential integral in the logarithmic portion of the inner layer. Also a mathematical explanation is given as to why the cylinder data do not deviate appreciably from the classical two dimensional law of the wall, even though it is observed that the turbulent characteristics, such as the size of large eddies and the turbulent intensities are much smaller than for a flat plate. Dissert. Abstr.

N79-26353 Illinois Univ. at Urbana-Champaign.
EXPERIMENTAL MEASUREMENTS OF THE BEHAVIOR OF NON DILUTE PARTICLE SUSPENSIONS IN TURBULENT FLOW Ph.D. Thesis
John Edward Gronager 1978 187 p
Avail: Univ. Microfilms Order No. 7913475

An investigation was made to determine the effects of particle density and particle volume concentration, on the behavior of suspended particles in a turbulent flow field. An analytical model was developed to incorporate the hydrodynamic interaction between particles in nondilute suspensions. The model was further extended for a large range of particle Reynolds numbers.
Dissert. Abstr.

N79-26354 Minnesota Univ., Minneapolis.
A CONTROL-VOLUME BASED FINITE ELEMENT METHOD FOR CONVECTIVE HEAT AND MASS TRANSFER Ph.D. Thesis
Bantwal Rabindranath Baliga 1978 372 p
Avail: Univ. Microfilms Order No. 7911971

A method designed to handle irregular shaped domains and work with highly nonuniform grids to predict convective flow and mass transfer is presented. The method was implemented in a number of computer programs. Using these programs, several test problems were solved. These include conduction-type problems, convection-diffusion problems, fluid flow problems, forced convection problems, and a natural convection problem.
Dissert. Abstr.

N79-26355 Georgia Inst. of Tech., Atlanta.
AN EVALUATION OF NOZZLE RESPONSE TO TRANSIENT DISTURBANCES Ph.D. Thesis
Suresh K. Aggarwal 1979 177 p
Avail: Univ. Microfilms Order No. 7913949

The nozzle response, expressed in terms of the admittance coefficients, which define an admittance relation at the nozzle entrance, and the transmittance coefficients, which characterize the radiated noise from the nozzle, was studied. An evaluation of nozzle response is of potential significance in further understanding of direct and indirect combustion noise. Although both noise types have their origins in the random turbulent combustion process taking place in a turbojet combustor, their relative importance and characteristics are greatly altered by the pressure fields existing downstream of the combustor. Experimental evidence provided shows that a temperature or a molecular weight pulse generates the same acoustic effect in a nonuniform flow and that a transient pulse is an effective way to determine the acoustic impedance. The transmission characteristics of nozzles for both the isentropic and nonisentropic noise are similar.
Dissert. Abstr.

N79-26356 Illinois Univ. at Urbana-Champaign.
DROPLET MIXING AND DEPOSITION IN A TURBULENT FLOW Ph.D. Thesis
David Daniel McCoy 1978 241 p
Avail: Univ. Microfilms Order No. 7913544

The rate of deposition to turbulence parameters characterizing the diffusion of heavy particles, the root-mean-square of the velocity fluctuations of the particles and the Lagrangian time scale of the particles were compared. The experiments were carried out in a 2.54 cm diameter vertical pipe through which air is flowing downward. Droplets with diameters of 180, 280, and 500 microns are injected through a capillary tube in the center of the pipe at an axial location where the air is fully developed. The gas velocity is varied between 500 and 3660 cm/sec. The droplet flux is measured at different positions in the pipe by using an electronic counting technique.
Dissert. Abstr.

N79-26357 Minnesota Univ., Minneapolis.
LOCAL AND AVERAGE HEAT TRANSFER CHARACTERISTICS FOR TURBULENT AIR FLOW IN AN ASYMMETRICALLY HEATED TUBE Ph.D. Thesis
Gary Richard Knowles 1978 203 p
Avail: Univ. Microfilms Order No. 7912034

Measurements were performed on a horizontal tube having an asymmetrically distributed heat input and cooled by internal turbulent air flow. Distributions of the tube wall temperature and heat transfer coefficients were determined which show both the axial and circumferential thermal development of the flow. Only one half of the tube circumference was heated. This permitted testing for buoyancy effects by alternatively positioning the heated surface at the top and at the bottom of the tube. Thermal development of the flow required a much greater length than is required for a uniformly heated tube with comparable Reynolds numbers. At 50 diameters from the entrance of the heated test section, there were indications that the flow was not fully developed at the highest Reynolds numbers. The Nusselt number averaged over the heated half of the tube wall compares well with that for fully developed flow in a uniformly heated tube. Dissert. Abstr.

N79-26358 Minnesota Univ., Minneapolis.
EXPERIMENTS HEAT TRANSFER AND PRESSURE DROP FOR AN ARRAY OF COLINEAR INTERRUPTED PLATES Ph.D. Thesis
Omer Nihat Cur 1978 123 p
Avail: Univ. Microfilms Order No. 7911992

Measurements of the heat transfer coefficients for the successive plates of the eight plate array affirmed the periodically developed regime and demonstrated the developmental pattern leading to its attainment. The fully developed Nusselt numbers obtained from the eight plate experiments increase with thickness. Thickness related increases in the developed Nusselt number of up to sixty five percent were encountered. For the two plate results, the curves of Nusselt number vs. spacing attain a local maximum and indicate that the conventional spacing to length ratio of unity is not necessarily optimal. The effect of the interruptions on the fully developed Nusselt number was also clearly demonstrated. In the fully turbulent regime, the fully developed heat transfer coefficients are on the order of twice those for a conventional duct flow. The pressure drop increase caused by increasing plate thickness is greater than the largest thickness related increase of the Nusselt number for both the two-plate and the eight-plate arrays. Dissert. Abstr.

N79-26359# Weapons Systems Research Lab., Adelaide (Australia).
AN ATTEMPTED EXTENSION OF A FINITE ELEMENT SOLUTION TO AXISYMMETRIC POTENTIAL FLOW
M. K. Haselgrove Nov. 1978 21 p refs
(WSRL-0056-TR; AR-001-422) Avail: NTIS HC A02/MF A01

A Galerkin finite element method, which was successfully applied to two-dimensional inviscid flow, was also applied to axisymmetric potential flow. Solutions were sought for three alternative formulations using different representations for the velocity components. Two of the formulations produced only poor results, while the third gave no worthwhile results at all. Possible reasons for the failure of the method are discussed. Author

N79-26360# Toronto Univ. (Ontario). Inst. for Aerospace Studies.
FINITE-DIFFERENCE SOLUTIONS FOR NONEQUILIBRIUM LAMINAR BOUNDARY LAYERS IN IONIZING-ARGON FLOWS
W. S. Liu May 1979 114 p refs
(Grant AF-AFOSR-3303-77)
(UTIAS-226; CN-ISSN-0082-5255) Avail: NTIS HC A06/MF A01

An implicit six-point finite-difference scheme is presented for solving two temperature chemical nonequilibrium laminar boundary layer flows in ionizing argon. Previous work was extended by considering the radiation energy loss and the chemical reactions in the plasma of the ionizing boundary layer. The variations of transport properties based on the known elastic scattering cross sections for an argon plasma across the boundary layer were considered. The effects of the chemical reactions, radiation energy loss and the electric sheath on the boundary layer structures were discussed. Both the flat plate and the shock tube sidewall boundary layer flows were analyzed and compared with interferometric data obtained using a 10 cm to 18 cm hypervelocity shock tube. R.E.S.

N79-26361# Office of Naval Research, Tokyo (Japan).
HIGH PRESSURE SCIENCE AND TECHNOLOGY IN JAPAN
Earl F. Skelton (NRL, Washington, D. C.) Jul. 1978 136 p
(ONRT-M1) Avail: NTIS HC A07/MF A01

This monograph which represents an overview of the field of high pressure science and technology in Japan is based primarily on discussions held with scientists during on-site visitations to forty-three high pressure laboratories. Particular attention is focused on the development of new or improved high pressure apparatus and efforts to synthesize super-hard materials via high pressure techniques, e.g., diamond and cubic boron nitride. Special note is also given to new or unusual high pressure data collection techniques; extended X-ray absorption fine structure and position sensitive proportional counters are two examples. Areas of scientific concern span the gambit from high pressure solid state physics and chemistry to studies of geophysical and biochemical reaction at elevated pressures. Appendices are provided with listings of Japanese scientists currently engaged in high pressure research and addresses of the appropriate institutional affiliations. A.R.H.

N79-26362# ARO, Inc., Arnold Air Force Station, Tenn.
JET SIMULATION TECHNIQUES: SIMULATION OF TEMPERATURE EFFECTS BY ALTERING GAS COMPOSITION Final Report, 1 Oct. 1976 - 30 Sep. 1977
W. L. Peters AEDC Mar. 1979 106 p refs
(AD-A067084; AEDC-TR-78-43) Avail: NTIS HC A06/MF A01 CSCL 20/4

The objective of this investigation was to evaluate the effects of individual jet exhaust properties on afterbody drag coefficient and to determine whether these properties affect drag by primarily altering the jet plume shape and/or jet entrainment. A large reduction in afterbody drag coefficient was observed with a decrease in the specific heat ratio at most underexpanded nozzle flow conditions. Regardless of free-stream Mach number of afterbody external configuration, an increase in the gas constant produced a consistent reduction in afterbody drag coefficient that was not a function of nozzle pressure ratio. The effects of gas constant increased for separated afterbody configurations and at transonic free-stream Mach numbers. From analysis of the experimental data, it was concluded that the effects of gas constant and specific heat ratio were, to a large extent separate, that the gas constant affected afterbody drag solely through the extrainment or mixing process, and that the specific heat ratio affected the drag primarily through determination of the inviscid jet plume shape. GRA

N79-26363# Nielsen Engineering and Research, Inc., Mountain View, Calif.
COMPUTER PROGRAM FOR CALCULATION OF SEPARATED TURBULENT FLOWS ON AXISYMMETRIC AFTERBODIES INCLUDING EXHAUST PLUME EFFECTS Final Report, 5 Jul. 1977 - 5 Sep. 1978
Gary D. Kuhn Mar. 1979 132 p refs
(Contract F40600-77-C-0008)
(AD-A066925; NEAR-TR-165; AEDC-TR-79-4) Avail: NTIS HC A07/MF A01 CSCL 21/5

A computer code for a turbulent boundary-layer, inviscid interaction method for axisymmetric configurations of the type used for isolated nozzle afterbody models is presented. The method is applicable to flows with subsonic free streams, including slightly supercritical flows and to bodies with either high pressure exhaust plumes or solid plume simulators. The method consists of an integral boundary-layer and plume-entrainment method and a finite-difference inviscid-flow method which are coupled iteratively through the boundary-layer displacement thickness. Both attached and separated boundary layers can be calculated. An option is provided for calculating two-dimensional boundary layers. The procedure for separated flows is to specify the displacement thickness of the boundary layer and calculate the

free-stream velocity distribution from both the boundary-layer equations and the inviscid-flow equations. The separation point location and the angle of the displacement surface are found by an iterative procedure. GRA

N79-26364# Flow Research, Inc., Kent, Wash.
TURBULENT FLOW PAST A SELF-PROPELLED VEHICLE. 2: COMPUTATION
Walter J. Grabowski and Robert E. Robins Nov. 1978 161 p Revised
(Contract N00014-76-C-0564; ARPA Order 1910)
(AD-A067795; FLOW-RN-95) Avail: NTIS HC A08/MF A01 CSCL 20/4

The ICWAKE computer code solves the Navier-Stokes equations for axisymmetric, incompressible, swirling, turbulent flow with large axial gradients. This document is a guide to the use of the code. Included are descriptions of the input parameters and the code structure, some general comments about using the code and a sample calculation. Author (GRA)

N79-26365# Mississippi State Univ., Mississippi State.
DEVELOPMENT OF PARTIAL CHANNEL FLOW FOR ARBITRARY INPUT VELOCITY DISTRIBUTIONS USING BOUNDARY-FITTED COORINATE SYSTEMS Final Report, 15 Feb. 1976 - 14 Feb. 1979
Leslie R. Hester and Joe F. Thompson Apr. 1979 4 p
(Contract DAAG29-76-G-0144)
(AD-A067623; ARO-13675.2-EX) Avail: NTIS HC A02/MF A01 CSCL 20/4

This report summarizes the results of the attempted solution of the class of problems associated with partial channel flows using a numerical technique of boundary-fitted coordinate systems. Author (GRA)

N79-26366# Oak Ridge National Lab., Tenn.
ORNL PWR-BDHT TWO-PHASE FLOW INSTRUMENTATION AND ANALYSIS IMPROVEMENTS
S. B. Cliff 1978 9 p refs Presented at 6th Water Reactor Safety Res. Meeting, Germantown, Md., 6 Nov. 1978
(Contract W-7405-eng-26)
(CONF-781146-9) Avail: NTIS HC A02/MF A01

Advances in two-phase flow instrumentation and analysis for the Thermal Hydraulics Test Facility are described. The work covered turbine meter bearings, drag disk targets, fast-response turbine meter monitoring electronics, turbine meter data recovery techniques, and differential pressure transducer time response. DOE

N79-26367# Electricite de France, Chatou. Dept. Systemes Energetiques.
HEAT TRANSFER MEDIUMS [LES FLUIDES CALOPORTEURS]
J. P. Allard May 1977 17 p refs In FRENCH
(P-52/D-08/77-10) Avail: NTIS HC A02/MF A01

Different mediums (gas, vapor, liquid) most commonly employed in industry for heat transfer are discussed. Data pertaining to the various properties of these mediums are presented. Criteria for choosing a medium are given together with the medium most commonly used for specific industrial applications. Author

N79-26368# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
NUMERICAL SOLUTION OF A STEADY, VISCOUS, AXISYMMETRIC CAVITY-FLOW PROBLEM
D. H. Ferriss and C. Hall 1979 39 p refs
(NPL-DNACS-12/79) Avail: NTIS HC A03/MF A01

As an initial stage in the modelling of a cyclone separator, an axisymmetric, incompressible form of the Navier-Stokes equations was expressed in terms of one of the vorticity components and a stream function. The resulting equations were solved numerically by the use of upwind finite difference techniques, various forms of which are introduced and discussed briefly. Results are presented in the form of computer graphics for two geometric configurations and three values of the Reynolds number. Author (ESA)

N79-26369# Oxford Univ. (England). Dept. of Engineering Sciences.
SECOND PRINCIPLE OF THERMODYNAMICS, DIRECTION OF HEAT FLOW AND FOURIER INEQUALITY: A COMPARATIVE ASSESSMENT
A. Paglietti (Cagliari Univ.) 1978 20 p refs Sponsored in part by NATO
(OUEL-1255/78) Avail: NTIS HC A02/MF A01

A formal proof is given of the equivalence between the local Clausius-Planck inequality and an inequality involving total heat flux and temperature gradient only. The status of the Fourier heat conduction inequality in relation to the second principle of thermodynamics is discussed. Author (ESA)

35 INSTRUMENTATION AND PHOTOGRAPHY

Includes remote sensors; measuring instruments and gages; detectors; cameras and photographic supplies; and holography.

For aerial photography see *43 Earth Resources*. For related information see also *06 Aircraft Instrumentation*, and *19 Spacecraft Instrumentation*.

N79-26370 Arizona Univ., Tucson.
FABRICATION AND TESTING OF A SENSITIVE ULTRAVIOLET-VISIBLE SILICON PHOTODIODE DEVICE Ph.D. Thesis
Jose delaLuz Martinez Montes 1979 104 p
Avail: Univ. Microfilms Order No. 7912537

The low temperature fabrication of a ultraviolet visible light detector was investigated. Interface charges between a low temperature grown anodic silicon dioxide and a silicon single crystal material are used to generate a strong electric field perpendicular to the photo-detection surface of the device. This electric field separates the photon created electron hole pairs in the silicon material to produce a net flux of electric current across the detector. Surface state charge generation in the anodic silicon dioxide-silicon interface were studied. An approximate one dimensional numerical analysis is employed to calculate the theoretical quantum efficiency of the device. The theoretical and experimental quantum efficiencies are compared. Ion implantation and low temperature anodic oxide growth technologies are employed for the fabrication of the light detector device. Dissert. Abstr.

N79-26371 Georgia Inst. of Tech., Atlanta.
ANGULAR ADDRESSING PROPERTIES OF VOLUME FOURIER TRANSFORM HOLOGRAMS IN IRON-DOPED LITHIUM NIOBATE Ph.D. Thesis
John Elbert Weaver 1979 142 p
Avail: Univ. Microfilms Order No. 7913851

The effect of variations in the reading beam incidence angle on the quality of the reconstructed images from volume Fourier transform holograms stored in iron-doped lithium niobate crystals is described. The image quality of a binary data page is indicated by the diffraction efficiency, which is measured directly, and by the probability of error in detection, which is determined from the measured irradiance distribution. Variation of the diffraction efficiency with reading beam incidence angle (angular selectivity) is measured using a logarithmic photodetector and a precision (889 steps/degree) laser beam deflection system. Angular selectivity measurements for bounded beam holograms, low data density Fourier transform holograms, and high data density Fourier transform holograms are presented. The results are compared with the predictions of the coupled-wave theory that describe diffraction of plane waves by volume (thick) holographic gratings. Dissert. Abstr.

N79-26372* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
MAGNETIC SUSPENSION AND POINTING SYSTEM Patent
Willard W. Anderson and Nelson J. Groom, inventors (to NASA) Issued 29 May 1979 4 p Filed 27 Feb. 1976 Supersedes

N76-18227 (14 - 09, p 1095)
(NASA-Case-LAR-11889-1; US-Patent-4,156,548; US-Patent-Appl-SN-662182; US-Patent-Class-308-10; US-Patent-Class-73-178R) Avail: US Patent and Trademark Office CSCL 14B

Apparatus for providing accurate pointing of instruments on a carrier vehicle and for providing isolation of the instruments from the vehicle's motion disturbances is presented. The apparatus includes two assemblies, with connecting interfaces, each assembly having a separate function. The first assembly is attached to the carrier vehicle and consists of an azimuth gimbal and an elevation gimbal which provide coarse pointing of the instruments by allowing two rotations of the instruments relative to the carrier vehicle. The second or vernier pointing assembly is made up of magnetic suspension and fine pointing actuators, roll motor segments, and an instrument mounting plate around which a continuous annular rim is attached which provides appropriate magnetic circuits for the actuators and the roll motor segments. The vernier pointing assembly provides six degree-of-freedom isolation from carrier motion disturbances.

Official Gazette of the U.S. Patent and Trademark Office

N79-26373# Toronto Univ. (Ontario). Inst. for Aerospace Studies.

PRELIMINARY WIND TUNNEL SIMULATION STUDY OF SNOW COLLECTION GAUGES

A. A. Haasz and S. Raimondo May 1979 33 p refs
(UTIAS-TN-219; CN-ISSN-0082-5263) Avail: NTIS HC A03/MF A01

Snow collection performance of three basic precipitation collectors (Sangamo Type A, Aerochem Metric Bucket, Event Bucket) used by the Ontario Ministry of the Environment were evaluated. There are two basic areas where collection deficiencies may arise during periods of relatively high wind velocities: when snow falls the air flow pattern in the vicinity of the collector may inhibit the capture of some of the snow particles, and after the accumulation of some snow in the collector, the entrained flow inside the collector cavity may be sufficient to cuase saltation resulting in the escape of some of the snow particles. Full scale collectors and 1/3 scale models were tested in wind tunnels with snow being simulated by glass beads and mica flakes.

Author

N79-26374*# Lockheed Missiles and Space Co., Huntsville, Ala. Research and Engineering Center.

INVESTIGATION OF A LASER DOPPLER VELOCIMETER SYSTEM TO MEASURE THE FLOW FIELD AROUND A LARGE SCALE V/STOL AIRCRAFT IN GROUND EFFECT

Andrew D. Zalay, Melvin R. Brashears, Archie J. Jordan, Kenneth R. Shrider, and Carl D. Vought May 1979 76 p refs Document includes a microfiche supplement
(Contract NAS2-8959)
(NASA-CR-152212; LMSC-HREC-TR-D568) Avail: NTIS HC E04/MF A01 CSCL 14B

The flow field measured around a hovering 70 percent scale vertical takeoff and landing (V/STOL) aircraft model is described. The velocity measurements were conducted with a ground based laser Doppler velocimeter. The remote sensing instrumentation and experimental tests of the velocity surveys are discussed. The distribution of vertical velocity in the fan jet and fountain; the radial velocity in the wall jet and the horizontal velocity along the aircraft underside are presented for different engine rpms and aircraft height abouve ground. Results show that it is feasible to use a mobile laser Doppler velocimeter to measure the flow field generated by a large scale V/STOL aircraft operating in ground effect. S.E.S.

N79-26375# Army Missile Research and Development Command, Redstone Arsenal, Ala. Technology Lab.

GYROCOMPASSING ERROR ANALYSIS FOR PERSHING 2 INERTIAL MEASUREMENT UNIT

H. V. White and J. C. Hung Nov. 1978 41 p refs
(AD-A067516; DRDMI-T-79-1) Avail: NTIS HC A03/MF A01 CSCL 16/4

This report documents the result of several error analyses for PERSHING II inertial measurement unit gyrocompassing. The analyses have been beneficial in three ways. They offered an opportunity for a better understanding of the underlying mechanisms governing the dependence of gyrocompassing error on error sources. The analytic results provide a means for estimating gyrocompassing error from known error sources, and pave the way for the development of a technique for identifying source errors from a properly devised test. Three categories of error sources are discussed. Detailed analyses were made for two categories. Analysis for the third category was not done here. GRA

N79-26376# Arizona Univ., Tucson. Optical Sciences Center.

HOLOGRAPHICALLY IMPROVED WINDOWS Final Report, 15 Apr. 1978 - 16 Apr. 1979

Chungte Chen and James C. Wyant 15 Mar. 1979 75 p refs
(Contract DASG60-77-C-0110)
(AD-A067914) Avail: NTIS HC A04/MF A01 CSCL 14/5

The objective of this project is to study the possibility of using holographic optical elements (HOE) as aberration correctors, and to develop the geometrical optical model of the HOE to simplify the design process. The light weight, low cost, and non-axial symmetry of the HOE make it attractive for application to aberration correction for missile domes. This study shows that theoretically more than 80% efficiency is obtainable for volume and blazed holograms. In practice, we should be able to achieve more than 70% efficiency for both types of holograms. The use of ACCOS V provides a simple technique for designing a HOE. To fabricate the high efficiency and nonplanar HOEs, we conclude that a promising method is to use the E-beam to write the blazed HOE. The disadvantage of the HOE is the linear dispersion with respect to wavelength, which causes the chromatic aberration of the HOE to be very large compared with that of a COE. This means a good temporally coherent source is necessary. In this study, we conclude that using a HOE to solve some of the optical design problems is feasible. GRA

N79-26377# California Univ., Livermore. Lawrence Livermore Lab.

FABRICATION OF MANGANIN STRESS GAUGES FOR USE IN DETONATING HIGH EXPLOSIVES

L. Erickson, R. Weingart, R. Barlett, J. Chan, G. Elliott, J. Janzen, H. Vantine, R. Lee (Kansas State Univ.), and J. T. Rosenberg (Stanford Research Inst.) 6 Feb. 1979 15 p refs Presented at the 10th Symp. on Explosives and Pyrotechnics, San Francisco, 14-16 Feb. 1979
(Contract W-7405-eng-48)
(UCRL-81371; Conf-790207-2) Avail: NTIS HC A02/MF A01

Data from stress gages embedded in shocked high-explosives can be used to estimate chemical energy release rates in the region of the gages and to test the validity of numerical hydrodynamic simulations of shock initiation experiments. No commercially available stress gages were suitable for this use. Techniques developed for fabricating and encapsulating manganin stress gages which can be used in a reacting high-explosive environment are described. Author (DOE)

N79-26378# Royal Aircraft Establishment, Farnborough (England).

THE DESIGN OF A HIGH PACKING DENSITY PCM MAGNETIC TAPE REPLAY SYSTEM

G. R. Labrum, D. C. Alexander, and C. W. Jackson London Sep. 1977 46 p refs Revised
(RAE-TR-77140; BR77140) Avail: NTIS HC A03/MF A01

A PCM magnetic tape replay system developed for the replay of airborne recordings made at high bit packing densitities is described. The high data capacity provided is intended to meet all RAE requirements for aircraft flight testing. The record/replay systems employ a multi-track serial word format particularly suited to recording in very severe airborne environments. Design of the replay system places special emphasis on ease of operation and the provision of a comprehensive error correcting system enables a high degree of data security to be obtained. Brief descriptions of the airborne recording and replay data handling systems are given and the results of performance testing presented with general comments on the choice and handling of magnetic tapes. Author (ESA)

N79-26379# Royal Aircraft Establishment, Farnborough (England). Instrumentation and Trials Dept.
AN AUTOMATIC PORTABLE TELECINE CAMERA
J. B. Humphreys and P. J. Mitchell 23 Aug. 1978 19 p ref
(RAE-TM-IT-177; BR65142) Avail: NTIS HC A02/MF A01

An automatic portable telecine system that enables television records to be transferred to 16 mm film for analysis or demonstration purposes is described. A television display is filmed by a modified 16 mm cine camera driven by a control unit in which the camera supply voltage is derived from the field synchronization pulses of the video signal. Automatic synchronization of the camera mechanism is achieved over a wide range of television field frequencies and the shutter bar effect, resulting from exposure time and camera speed errors in non-synchronised systems, is eliminated. Author (ESA)

N79-26380# Central Electricity Generating Board, Bristol (England). Scientific Services Dept.
MULTICHANNEL PRESSURE SAMPLING AND STORAGE SYSTEM
K. J. Hockings Dec. 1978 8 p refs
(TDB-318) Avail: NTIS HC A02/MF A01

For multiple sampling of power station plant parameters such as pressure or flow, it is proposed to install one transducer for three or four sample points and then switch sequentially by means of a timer control (1) the input pressure signals to the transducer via a rotary switch valve, (2) the resultant output electrical signals from the transducers to storage capacitors for subsequent reading by a data logging system. Author (ESA)

N79-26381# National Bureau of Standards, Boulder, Colo. Thermophysical Properties Div.
RADIO FREQUENCY LIQUID LEVEL GAUGING IN PROPANE TANK CAR SAFETY TESTS: A FEASIBILITY STUDY
J. D. Siegwarth Jan. 1979 15 p refs
(PB-292978/4; NBSIR-79-1600) Avail: NTIS HC A02/MF A01 CSCL 13L

Selected radio frequency (rf) resonances of an empty 30,300 liter (8,000 gallon) tank car were measured to determine whether rf can be used to gauge the propane liquid levels during tank car fire safety tests. The change of resonant frequencies of a small horizontal cylindrical tank as a function of liquid volume has been tested in order to estimate the precision to which the amount of propane in a tank car can be measured. The technique is applicable to routine tank car gauging. GRA

N79-26382# Lockheed Missiles and Space Co., Sunnyvale, Calif.
THE DEVELOPMENT OF A MICROWAVE RADIOMETER FOR USE AS A HIGHWAY ICE DETECTOR Final Report, Sep. 1977 - Aug. 1978
S. Berinsky, H. K. Hong, T. H. Lee, and W. T. Schrader Sep. 1978 152 p refs
(Contract DOT-FH-11-9328)
(PB-292645/9; FHWA/RD-78-203) Avail: NTIS HC A08/MF A01 CSCL 13B

A system capable of detecting snow, ice, frost, or slush over a highway bridge deck area greater than 4 x 2 feet (1.2 x 0.6 m) was developed and a valid alarm signal to warn motorists of a hazard was determined. The detection system selected was a microwave radiometer operating at 10 GHz which continuously samples a reference noise source and internal amplifier noise to provide measurement corrections of radiated power received from the road surface being observed. Principal radiometer components are: rectangular horn antenna; sensitive receiver; and signal processor/alarm unit. The successive program phases were: (1) design optimization and system tradeoffs; (2) breadboard model laboratory and field tests; and (3) prototype model design, fabrication and test. Test results on asphalt and concrete roadway simulators, as well as actual asphalt roads, correlated with previously published radiometric temperatures for similar surfaces. GRA

36 LASERS AND MASERS

Includes parametric amplifiers.

N79-26383 Illinois Univ. at Urbana-Champaign, Urbana.
AN INVESTIGATION OF THE ATOMIC FLUORINE LASER EXCITED IN A HOLLOW CATHODE DISCHARGE Ph.D. Thesis
John Kenton Crane, III 1978 95 p
Avail: Univ. Microfilms Order No. 7913416

Using a hollow cathode, it is possible to obtain uniform, stable, long pulse discharges in gas mixtures involving highly electronegative constituents (SF6, CCl4, NF3, I2). Such a hollow cathode device was used to investigate the atomic Fluorine laser. In the hollow cathode, lasing on Fluorine transitions in the doublet system lasted for up to 80 microseconds with no signs of the self-termination reported previously in positive column devices. The mechanism for pumping the upper Fluorine state appears to be a 2-step process, the details of which are discussed.
Dissert. Abstr.

N79-26384*# Mathematical Sciences Northwest, Inc., Bellevue, Wash.
DESIGN INVESTIGATION OF SOLAR POWERED LASERS FOR SPACE APPLICATIONS Final Report
R. Taussig, C. Bruzzone, D. Quimby, L. Nelson, W. Christiansen, S. Neice, P. Cassady, and A. Pindroh May 1979 184 p refs
(Contract NAS3-21134)
(NASA-CR-159554; MSNW-79-1087/1090-1) Avail: NTIS HC A09/MF A01 CSCL 20E

The feasibility of solar powered lasers for continuous operation in space power transmission was investigated. Laser power transmission in space over distances of 10 to 100 thousand kilometers appears possible. A variety of lasers was considered, including solar-powered GDLs and EDLs, and solar-pumped lasers. An indirect solar-pumped laser was investigated which uses a solar-heated black body cavity to pump the lasant. Efficiencies in the range of 10 to 20 percent are projected for these indirect optically pumped lasers. G.Y.

N79-26385*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LARGE VOLUME MULTIPLE PATH NUCLEAR PUMPED LASER Patent Application
Russell J. Deyoung (Miami Univ., Oxford, Ohio) and Frank Hohl, inventors (to NASA) Filed 21 May 1979 9 p
(NASA-Case-LAR-12592-1; US-Patent-Appl-SN-041141) Avail: NTIS HC A02/MF A01 CSCL 20E

A large volume multiple-path nuclear pumper laser which improved characteristics over previous cylindrical nuclear pumped laser systems is presented. Large volumes of gas are excited by using internal high reflectance mirrors that are arranged so that the optical path crosses back and forth through the excited gaseous medium. By adjusting the external dielectric mirrors of the laser, the number of paths through the laser cavity can be varied. Output powers were obtained that are substantially higher than the output powers of previous nuclear laser systems. NASA

N79-26386# Hughes Research Labs., Malibu, Calif.
CORRECTION OF PHASE DISTORTION BY NONLINEAR OPTICAL TECHNIQUES Interim Technical Report, 15 Jul. 1977 - 30 Sep. 1978
C. R. Giuliano, R. W. Hellwarth, R. K. Jain, R. C. Lind, and T. R. OMeara Mar. 1979 135 p refs
(Contract N00014-77-C-0593; ARPA Order 3427)
(AD-A066148) Avail: NTIS HC A07/MF A01 CSCL 20/5

The main accomplishments of the first phase of the program are listed below: demonstrated complete aberration correction by SBS (Stimulated Brillouin Scattering) for beams aberrated to 35X the diffraction limit; performed detailed photographic measurements to establish spatial distribution of beam profiles to intensities down to about .0001 of peak intensity; established experimentally that the fraction of nonconjugate return when using SBS for correction is below measurement limits; developed systems applications exploiting novel variations of nonlinear phase conjugation techniques in the area of high-power oscillator compensation, master-oscillator power-amplifier train compensation, and systems which require correction for atmospheric turbulence with very high spatial frequency content; and furthered the theoretical understanding of phase conjugation by SBS in waveguides and in nonwaveguide (free space) geometries. GRA

N79-26387# Naval Research Lab., Washington, D. C.
FREE ELECTRON LASERS AND STIMULATED SCATTERING FROM RELATIVISTIC ELECTRON BEAMS Interim Report
P. Sprangle, Robert A. Smith, and V. L. Granatstein Dec. 1978 76 p refs
(RR0110941)
(AD-A066177; AD-E000269; NRL-MR-3911) Avail: NTIS HC A05/MF A01 CSCL 20/5

Free electron lasers based on stimulated scattering from relativistic electron beams show potential for a new class of coherent radiation sources ranging from millimeter wavelengths down to optical wavelengths and beyond which are characterized by continuous tunability, very high power levels and competitive efficiencies. Here we present a comprehensive fully-relativistic treatment of stimulated backscattering from an electron beam with streaming velocity beta(sub zo)c. The incident pump wave is taken to be a static, circularly polarized, periodic magnetic field with wavenumber K sub O; the frequency of the scattered radiation is beta(sub zo) ck(sub O)/1-beta(sub zo). The analysis is linear in the scattered wave fields, but contains the pump field to all orders. The physical mechanism of the backscattering is provided by the v X B ponderomotive forces acting on the beam electrons in the presence of both the pump and the scattered waves. This force produces a longitudinal charge bunching which in turn gives rise to source currents for the scattered waves.
GRA

N79-26388# Northrop Research and Technology Center, Palos Verdes Peninsula, Calif.
INVESTIGATION OF GAIN AND ABSORPTION PROCESSES IN THE CADMIUM-MERCURY EXCIMER Final Technical Report, 1 Jun. 1977 - 28 Feb. 1979
J. B. West, H. Komine, and A. E. Stappaerts Mar. 1979 77 p refs
(Contract N00014-77-C-0491)
(AD-A066321; NRTC-79-6R) Avail: NTIS HC A05/MF A01 CSCL 20/5

The CdHg excimer has received attention as a possible efficient visible laser medium. In the experiments described here, a pulsed, tunable laser was used to excite the Cd atomic state which forms CdHg excimers in three body collisions with Hg and Ar. Gain and absorption measurements were performed by using an argon-ion laser to probe several wavelengths within the 470 nm excimer emission band. Net absorption was observed at all wavelengths investigated. Acoustic and thermal disturbances which might mimic absorption have been carefully considered and it is determined that these are not important. We conclude that the CdHg excimer exhibits net absorption within its 470 nm emission band. These results cast considerable doubt on the possibility of efficient laser action in CdHg. Author (GRA)

N79-26389# Naval Research Lab., Washington, D. C.
THEORY OF SOLID STATE CYCLOTRON MASER Interim Report
A. K. Ganguly and K. R. Chu Jan. 1979 35 p refs
(RR0110941)
(AD-A066174; AD-E000274) Avail: NTIS HC A03/MF A01 CSCL 20/5

A theory is developed for the cyclotron maser interaction between an electron beam and the electromagnetic waves in a cavity formed with a semiconductor having nonparabolic energy bands. The interaction originates from the dependence of the effective mass of the electron (hence cyclotron frequency) on its velocity due to nonparabolic energy-momentum relation. This mechanism is very similar to that for the cyclotron maser radiation in vacuum tubes where the relativistic variation of mass with velocity is utilized. The linear response of the electron beam to the cavity fields are obtained from Vlasov equation and the Maxwell's equations while collisions are treated with an approximate model. Analytical expressions for the beam-wave coupling coefficient, beam energy loss and the threshold power are derived for the fundamental and higher cyclotron harmonics. The dependence of these quantities on the various parameters such as cavity length, beam position, beam energy, magnetic field, etc. are discussed. Author (GRA)

N79-26390# Harris Corp., Melbourne, Fla. Electro-Optics Dept.
SCANNER DEVELOPMENT Final Report, May 1977 - May 1978
M. O. Greer, M. L. Shah, B. R. Reddersen, and T. R. Bader Wright-Patterson AFB, Ohio AFAL Jul. 1978 155 p refs
(Contract F33615-77-C-1032)
(AD-A066902; AFAL-TR-78-117) Avail: NTIS HC A08/MF A01 CSCL 09/3

This report describes the development of a high speed laser scanner for spectrum analysis in ELINT applications. A design of an ATWL laser scanner was made with 200 KHz line rate, 1000 spots per line and 1000 line format, and a recording bandwidth of 100MHz at 3dB points. An electronic drive circuit was designed and fabricated that achieved a 100% duty line scan with 2% dead time from frame to frame. An analysis was made to determine the optimum drive to the ATWL.
Author (GRA)

N79-26391# Alabama Univ. in Huntsville. Dept. of Physics.
RESEARCH ON RESONANT CHARGE-EXCHANGE X-RAY AND ULTRAVIOLET LASERS Final Report, 16 Jun. 1975 - 28 Dec. 1979
William B. McKnight Mar. 1979 22 p refs
(Grants DAHC04-75-G-0193; DAAG29-77-G-0134)
(AD-A067227; ARO-13095.3-P) Avail: NTIS HC A02/MF A01 CSCL 20/5

This report presents a summary of work carried out on X-ray and far ultra-violet laser research, in which excited states are obtained by charge-exchange between an atom or ion and a fully stripped ion. Schemes investigated include the expansion of plasma produced in a shock-tube and a plasma produced by a laser-target interaction. The laser-produced plasma, intended to produce stimulated emission at 182 A, was the subject of experimental work, with negative results. Author (GRA)

N79-26392# Battelle Columbus Labs., Ohio.
COMPUTATIONAL STUDY OF CHEMICAL REACTION DYNAMICS AT THE GAS-SOLID INTERFACE Interim Report, 1 Oct. 1977 - 30 Sep. 1978
George Wolken, Jr. 20 Nov. 1978 75 p refs
(Contract F49620-77-C-0004)
(AD-A067854; AFOSR-79-0448TR) Avail: NTIS HC A04/MF A01 CSCL 20/5

By means of computer simulations, the necessary conditions for obtaining vibrational population inversions by means of reactions catalyzed by solid surfaces has been determined. A model potential describing in a realistic way the interactions of gases with solid surfaces was developed, including the possibility of energy transfer between the gas and the solid. Classical trajectory studies were carried out for both adsorption and desorption. A list of conditions has been produced detailing the conditions under which useful vibrational population inversions may be expected in the molecules produced from such heterogeneous catalysis. Author (GRA)

N79-26393# Utah Univ., Salt Lake City. Dept. of Chemistry.
LASER STUDIES OF REACTIONS Final Technical Report, Mar. 1975 - Feb. 1979
Edward M. Eyring 28 Feb. 1979 21 p refs
(Contract N00014-75-C-0796)
(AD-A067855) Avail: NTIS HC A02/MF A01 CSCL 05/1

Research at the University of Utah under ONR contract covering the period March 1975 - February 1979 includes: (1) Results of ultrasonic absorption kinetics studies of macrocyclic ligands (crown ethers and cyclodextrins) in aqueous salt solutions and application of these results to a scheme for separating radioactive cesium and strontium from nuclear reactor wastes; (2) An unsuccessful laser flash photolysis study of bovine rhodospin; and (3) The evolution of hydrogen gas from a visibly illuminated, water bathed, titanium (III) exchanged zeolite and the construction of a photoacoustic spectroscopy apparatus for determining the action spectrum of this material. Three recommendations for further work are outlined. The report concludes with a list of sixteen publications acknowledging ONR support.
GRA

N79-26394# Office of the Project Manager High Energy Laser, Redstone Arsenal, Ala.
OPTICAL QUALITY OF TILTED SPHERICAL MIRROR

UNSTABLE RESONATORS
R. William Jones, James C. Nixon, Charles Cason, and James F. Perkins Jan. 1979 121 p refs
(DA Proj. 1X2-63314-D-093)
(AD-A068015; DRCPM-HEL-79-2) Avail: NTIS HC A06/MF A01 CSCL 20/6

A new class of resonators has recently been proposed which has the property of having different magnifications Mx and My in orthogonal directions perpendicular to the propagation direction; the most interesting cases are those with collimated output analagous to conventional confocal unstable resonators. The designs utilize spherical mirrors which are tilted substantially from the mirror normal. The conventional orientation requires the mirror normal to be along (or very nearly parallel to) the propagation direction. Use of spherical mirrors by this new class of resonators eliminates the difficulties of fabricating mirrors with more complex figures, which would otherwise be required to achieve the desired asymmetric magnification. The critical problem of keeping beam-quality degradation (aberrations) due to mirror tilt within acceptable limits has been examined experimentally and analytically. The results confirm the possibility of achieving acceptable small aberrations for large tilt angles (convex mirror tilt as large as 70 deg, corresponding to 140 deg beam deflection) to operation at infrared wavelengths. GRA

N79-26395# United Nuclear Industries, Inc., Richland, Wash.
WELDING OF COPPER SILICON AND ZIRCONIUM II USING THE 1200 WATT CO2 CONTINUOUS LASER
E. L. Shaber and B. L. Debban 21 Nov. 1978 19 p refs
(Contract EY-76-C-06-1857)
(UNI-1190) Avail: NTIS HC A02/MF A01

An investigation using a CO2 continuous wave laser was conducted. The investigation was conducted in search of an improved and updated welding technique for coextrusion billet encapsulation components. The failure TIG welds on billet encapsulation components is a major contributor to extrusion unbond experience and corresponding uranium utilization costs. Present TIG equipment is technically obsolescent. The results are presented of the investigation. Acquisition of a laser system for billet encapsulation component welding is recommended. The system would initially be placed in a development laboratory for debugging, verification of safety consideration and training purposes. DOE

N79-26396# Los Alamos Scientific Lab., N. Mex.
ULTRAVIOLET DAMAGE RESISTANCE OF LASER COATINGS
Brian E. Newman and D. H Gill 1978 19 p refs Presented at 10th Symp. on Laser induced Damage Mater., Boulder, Colo., 12 Sep. 1978
(Contract W-7405-eng-36)
(LA-UR-78-2607; Conf-780982-1) Avail: NTIS HC A02/MF A01

The damage resistance of several thin film materials used in ultraviolet laser optics was measured at 266 and 355 nm. The coatings included single, quarterwave (QW) layers of NaF, LaF3, MgF2 ThO2, Al2O3 HfO2, ZrO2, Y2O3 and SiO2, plus multilayer reflectors composed of some of these materials. The substrates were uv-grade fused silica. Singleshot thresholds were obtained with 22 ns and 27 ns pulses at 266 and 355 nM, respectively. At 266 nm the coating with the highest damage threshold was a QW layer of NaF at 10.8 J/cm square whereas for a maximum reflector of Al2O3/MaF the value was 3.6 J/cm square, and the threshold of the maximum reflector was 12.2 J/cm. The results were analyzed to determine correlations with standing wave electric fields and linear and two photon absorption. Scaling relationships for wavelength, refractive index and atomic density, and pulsewidth were found. DOE

N79-26397# Los Alamos Scientific Lab., N. Mex.
PLATED COPPER SUBSTRATES FOR THE LASL ANTARES CO2 LASER SYSTEM
David J. Blevins and James L. Munroe 1979 7 p refs Presented at SPIE Los Angeles Tech. Symp. Opt. Components: Manuf. and Evaluation, North Hollywood, Calif., 22-23 Jan. 1979
(Contract W-7405-eng-36)
(LA-UR-79-9; Conf-790129-1) Avail: NTIS HC A02/MF A01

Antares is a large carbon-dioxide laser system presently under construction at the Los Alamos Scientific Laboratory (LASL). As part of the high energy gas laser facility, Antares will investigate inertial confinement fusion with light of 10.6 micron wavelength. Most of the optics comprising Antares will be reflectors and, for many reasons, copper is the material of choice. The mirrors range in size from 2.5 cm in diameter to 45 cm in diameter. The copper must be very pure to help maximize damage threshold, making plated copper an attractive solution. The final mirror should be very stable, i.e., characterized by very low microcreep. This makes an alloy a more suitable substrate candidate than pure copper. For Antares, all of the smaller mirrors will be made of copper plated onto an aluminum-bronze substrate, and all of the larger mirrors will be made of copper plated onto aluminum alloy 2124. DOE

N79-26398# Bendix Corp., Kansas City, Kans.
EQUIPMENT FOR A LASER SURFACE MEASURING SYSTEM
R. T. Stagner Nov. 1978 40 p refs Revised
(Contract EY-76-C-04-0613)
(BDX-613-1848-Rev) Avail: NTIS HC A03/MF A01

An automated device for inspection of highly polished spherical surfaces was designed and the components substantially integrated into a functional system which was used to provide experimental data. The computer-controlled opto-electronic system processes laser light reflected from polished surfaces and provides data from which the size of small flaws may be determined. Operating parameters for the system were characterized and projected inspection times calculated for various sphere sizes. DOE

37 MECHANICAL ENGINEERING

Includes auxiliary systems (non-power); machine elements and processes; and mechanical equipment.

N79-26399 Iowa Univ., Iowa City.
DYNAMIC ANALYSIS AND DESIGN SENSITIVITY ANALYSIS OF MECHANISMS WITH INTERMITTENT MOTION Ph.D. Thesis
Paul Ernest Ehle 1978 246 p
Avail: Univ. Microfilms Order No. 7912848

Mechanisms that exhibit intermittent motion are characterized by the presence of many essentially discontinuous forces, masses, velocities, and potential energies. These near-discontinuities are caused by mechanical events that are often controlled by complex logical criteria. Many machine tools, military automatic weapons, and office machines are members of the class of intermittent motion mechanisms. A method that can serve as the basis for a general computer code is developed. This approach, called the logical function method, is rooted in an area of mathematics called the theory of distributions. The logic associated with the sudden addition and withdrawal of forces, masses, and potential energies is incorporated in the problem formulation. A simple spring-mass example is solved analytically. A complicated ten-mass example is solved to show feasibility of the method for realistic problems. Dissert. Abstr.

N79-26400 Illinois Univ. at Urbana-Champaign.
AN EXPERIMENTAL HEAT TRANSFER STUDY OF THE STRAIGHT PORTION OF THE EXHAUST PORT OF A SPARK IGNITION ENGINE Ph.D. Thesis
Gregory Lynn Malchow 1978 121 p
Avail: Univ. Microfilms Order No. 7913540

Concern over the exhaust emissions and cooling requirements of internal combustion engines triggered considerable interest in exhaust port heat transfer. Exhaust gas temperatures, gas wall temperatures, and exhaust gas flow rate were measured as a function of time. The exhaust gas temperature was found to be a function of time and distance from the exhaust valve. At a location 4 inches from the exhaust valve seat, temperature differences as high as 1800 R were measured during the engine cycle, and time averaged exhaust gas temperature drops of 400 R over an axial distance of 4 inches were recorded. Locally measured heat fluxes were found to be geometrically dependent. The highest heat fluxes were located nearest the

exhaust valve and along the large radius of the flow path. By employing time average values of temperature and mass flow rate, the steady state heat transfer could be correlated within a discrepancy of 12.5%. Dissert. Abstr.

N79-26401# Army Armament Research and Development Command, Fort Monmouth, N. J. Management Information Systems Directorate.

DESIGN CHARTS FOR TORSIONAL PROPERTIES OF NON-CIRCULAR SHAFTS Final Report

Robert I. Isakower Nov. 1978 84 p refs

(AD-A064109; AD-E400262; ARMID-TR-78001) Avail: NTIS HC A05/MF A01 CSCL 13/9

Design charts and tables were developed for the elastic torsional stress analyses of prismatic shafts, splines, and spring bars with virtually all commonly encountered cross sections. Circular shafts with rectangular and circular keyways, external splines, and milled flats along with rectangular and X-shaped torsion bars are presented. A computer program was developed which provides a finite difference solution to the governing partial differential equation (Poisson's) which defines the stress function. Using the stress function for the various shapes and Prandtl's membrane analogy, dimensionless design charts for transmitted torque and maximum shearing stress is produced. Additionally, the transmitted torque (or twisting moment) of hollow shafts can be obtained by using the principles of parallel shafts, even if both inner and outer cross-sectional contours are non-circular and of different shapes. A.R.H.

N79-26402*# Old Dominion Univ. Research Foundation, Norfolk, Va.

INVESTIGATIONS INTO THE MECHANICAL BEHAVIOR OF COMPOSITE BOLTED JOINTS Interim Report, Jun. 1978 - Mar. 1979

Earl A. Thornton, J. C. Perry, and M. W. Hyer Jun. 1979 62 p refs

(Grant NsG-1167)

(NASA-CR-158752) Avail: NTIS HC A04/MF A01 CSCL 13F

Testing procedures, data reduction, and data interpretation methods used to study the mechanical behavior of graphite-polyimide bolted joints at room temperature, -157 C (-250 F), and 315 C (600 F) are described. The load transfer characteristics, from one bolt to another, in double-bolt joints were determined by examining data generated in previous investigations. From the results, it appears the increase in load-carrying capacity by adding a second bolt in tandem can be predicted. A.R.H.

N79-26403# United Technologies Research Center, East Hartford, Conn.

FEASIBILITY STUDY OF AUTOMATIVE STIRLING ENGINE HEATERS

1979 75 p

(R77-719021) Avail: NTIS HC A04/MF A01

Research was conducted by United Technologies Corporation to determine the applicability of United's expertise to the potential improvement and cost reduction of the heater head assembly of the Ford/Philips 4-215 Stirling automotive engine. Included are configuration characteristics, heat transfer, tubing materials selection, structural integrity and stresses, manufacturing procedures and estimated production costs. Related considerations of the interactions between heater head characteristics and the complete power train and automobile system were investigated. The evaluation of several conceptual heater head designs which could form the basis for improvements in the 4-215 engine are presented. One of these designs requires only 50 percent of the material required for the basic 4-215 configuration. On the basis of this study, there is a probability that an uncoated heater for the Ford Stirling 4-215 engine could be manufactured at a cost below the Ford cost objective of $150. Improved engine performance results from adaptations of the features of this design were observed. M.M.M.

N79-26404# Los Alamos Scientific Lab., N. Mex.

VIBRATION ISOLATION MEASUREMENTS ON A PRECISION MACHINE TOOL

Richard L. Rhorer 1978 10 p refs Presented at Interagency Mechanical Operating Group Machine Tool Subgroup Meeting, Golden, Colo., 24 Oct. 1978

(Contract W-7405-eng-36)

(LA-UR-78-3252; Conf-7810128-2) Avail: NTIS HC A02/MF A01

Experiments performed to determine the effectiveness of an air isolation system for isolating a precision turning machine from floor vibrations are described. An accelerometer and spectrum analyzer were used for evaluating the performance of the machine and isolation system. The isolation system was found to be effective. DOE

N79-26405# Bendix Corp., Kansas City, Kans.

SLOTTING BY ELECTROCHEMICAL GRINDING

R. W. Stiles Nov. 1978 22 p refs Revised

(Contract EY-76-C-04-0613)

(BDX-613-1908-Rev) Avail: NTIS HC A02/MF A01

Cutting tests were performed with both Al2O3 copper-bond and diamond grinding wheels to determine tolerance capabilities in the production of narrow slots by electrochemical grinding. The effects of varying machining parameters were studied. Slot tolerance was + or - 97.79 microns with the Al2O3 wheel and + or - 106.68 microns with the diamond wheel. The diamond wheel is superior because of its wear resistance. DOE

N79-26406# Bari Univ. (Italy). Ist. di Macchine.

COMPARISON BETWEEN TWO CALCULATION PROCEDURES FOR INTERNAL COMBUSTION ENGINE EXHAUST SYSTEMS [CONFRONTO TRA DUE METODI DI CALCOLO DEI CONDOTTI DI SCARICO DEI MOTORI ALTERNATIVI]

Andrea Dadone, Luigi Mangialardi, and Francesco Varrese Jul. 1977 23 p refs In ITALIAN

(Contract CNR-76-00771-07)

Avail: NTIS HC A03/MF A01

The theoretically attainable results for two calculation procedures were compared. The first is based on a classic characteristics method, while the second is based on a modified finite differences method, using the second order integration MacCormack scheme. The theoretical results were comparted with experimental pressure measurements on a simulated monocylinder exhaust system as reported in the literature. The comparison is done varying the number of component loops in the model system. The finite difference method gives better results with a lower number of loops, requiring less computer time, while the other method is less dependable because of the integration variables used. Author (ESA)

N79-26407# Royal Aircraft Establishment, Farnborough (England).

WEAR PROPERTIES OF DRY BEARING LINERS AT AMBIENT AND ELEVATED TEMPERATURES: A PRELIMINARY SURVEY

R. B. King 19 Jun. 1978 34 p

(RAE-TR-78063; BR64930) Avail: NTIS HC A03/MF A01

The friction and wear properties of a wide range of dry bearing liners, both commercial and experimental, were examined on a modified 'pin on ring' apparatus at temperatures up to 150 C. Test results show that specific wear rates under ambient conditions differ appreciably, ranging from 0.07 x micro cu mm/Nm to 5.52 x micro cu mm/Nm. Author (ESA)

N79-26408# Central Electricity Generating Board, Harrogate (England). Mechanical Engineering Branch.

PULVERISED FUEL NON-RETURN FLAP VALVE

P. Holdsworth Dec. 1978 3 p Original contains color illustrations

(TDB-317) Avail: NTIS HC A02/MF A01

All previous nonreturn flap valves for P.F. pipelines have been fabricated or cast with bodies of rectangular section. These are inherently weak when subject to an internal pressure. As some P.F. systems now have to withstand an internal pressure of 31 bars, the logical shape to make the body is tubular, but this then created a design problem with the flap. This has been overcome by making the flap curved so that in the open position it will fit closely against the side of the body. The shape of the seat also tends to avoid build-up of dormant P.F. deposits. Color illustrations of a prototype are given. Author (ESA)

N79-26409# Hanford Engineering Development Lab., Richland, Wash.
DYNAMIC ANALYSIS TO ESTABLISH NORMAL SHOCK AND VIBRATION OF RADIOACTIVE MATERIAL SHIPPING PACKAGES Quarterly Progress Report, Jul. - Sep. 1978
S. R. Fields and S. J. Mech Mar. 1979 43 p refs
(Contract NRC-60-78-254)
(PB-293660/7; HEDL-TME-78-102; NUREG-CR-0589) Avail: NTIS HC A03/MF A01 CSCL 18F

A calculation sequence was developed to simulate the behavior of the coupler subsystem for the cask-rail car (hammer car) and the lead car in the group it impacts (struck car) during humping operations. This new coupler submodel simulates the hysteresis-type behavior of friction draft gears. Friction draft gears consist of springs and dampers in parallel rather than the series arrangement upon which the previous calculation sequence was based. Results from the submodel compare well with experimental results for friction draft gears in their active state during impact (before bottoming out and during recoil). This coupler submodel will now be incorporated into the full cask-rail car model. GRA

N79-26410# Environmental Protection Agency, Ann Arbor, Mich. Standards Development and Support Branch.
EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY GASOLINE POWERED VEHICLE OVER VARIOUS DRIVING CYCLES: 427 CUBIC INCH 1977 CALIFORNIA GMC 6500
Richard Nash Aug. 1978 42 p
(PB-293530/2; HDV-78-09) Avail: NTIS HC A03/MF A01 CSCL 21D

The driving cycles were developed from actual in-use operational data collected in New York and Los Angeles. In each location, both freeway and non-freeway operational parameters were recorded. A data matrix (relating speed, acceleration and frequency of occurrance) was prepared for each city and class of operation. Evaluation of the concept of chassis testing for heavy-duty vehicles was the major purpose of this project. The test program was designed to measure the sensitivity of exhaust emissions and fuel economy to the various driving cycles and road load conditions. GRA

N79-26411# Department of Energy, Bartlesville, Okla. Energy Research Center.
PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES. THIRD SERIES: REPORT NO. 2, 1978 PONTIAC, 301 CID (4.9 LITERS), 2V Interim Report
D. E. Koehler and M. F. Marshall May 1978 59 p
(Contract DOT-TSC-RA-77-07)
(PB-293772/0; BERC/OP-78/21; DOT-TSC-NHTSA-79-2; DOT-HS-803-831) Avail: NTIS HC A04/MF A01 CSCL 21G

Experimental data were obtained in dynamometer tests to determine fuel consumption and emissions (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine operating modes. The engine performance data obtained are used to estimate and emissions and fuel economy for varied engine service and duty to provide basic input for engineering calculations involving transportation. GRA

N79-26412# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
AUTOMOTIVE FUEL ECONOMY AND EMISSIONS EXPERIMENTAL DATA Final Report, Jun. 1975 - Dec. 1976
Mack W. Dowdy and Ronald L. Baisley Feb. 1979 217 p refs
(Contract DOT-TSC-RA-75-41)
(PB-293580/7; JPL-Pub-78-21; DOT-HS-803-808; DOT-TSC-NHTSA-19-15) Avail: NTIS HC A10/MF A01 CSCL 13F

An assessment of the relationship between automobile fuel economy and emission control systems is given. Tests were made at both the engine and vehicle levels. Investigations were made on cold-start emissions devices, exhaust gas recirculation systems, and air injection reactor systems. An alternative emission control system and modified control strategy were implemented and tested in the vehicle based on the results of engine tests. With the same fuel economy and NOx emissions as the stock vehicle, the modified vehicle reduced HC and CO emissions by about 20 percent. By removing the NOx emissions constraint, the modified vehicle demonstrated about 12 percent better fuel economy than the stock vehicle. GRA

38 QUALITY ASSURANCE AND RELIABILITY

Includes product sampling procedures and techniques; and quality control.

N79-26413 Ohio State Univ., Columbus.
AN ACCURATE RELIABILITY MODELING TECHNIQUE FOR HYBRID MODULAR REDUNDANT DIGITAL SYSTEMS USING MODULAR CHARACTERISTIC ERROR PARAMETERS Ph.D. Thesis
Victor Peter Nelson 1978 281 p
Avail: Univ. Microfilms Order No. 7908188

The use of hybrid modular redundancy (HMR) in the design of a digital system allows a number of system modules to fail and to be replaced with standby spares to prolong the functional life and reliability of the system. Reliability modeling of such systems is normally carried out at one of two levels within the system, with trade-offs between model complexity and accuracy. At the module level, the concern is with the survival probability of a minimum number of system modules. A more accurate model examines the effect of each potential logic component failure in the context of each potential system state and input. A reliability modeling technique which combines these two levels of analysis is presented. The reliability model is used to evaluate the effects of voting, switching, and disagreement-detection VSD failures on the overall reliability of an HMR system. The use of minimization and redundancy in the realization of a switching function is also evaluated with the model.
Dissert. Abstr.

N79-26414 Delaware Univ., Newark.
THE DIRECT PHASE CEPSTRUM AND ITS APPLICATIONS TO ULTRASONIC TESTING Ph.D. Thesis
Ramesh Shankar 1978 114 p
Avail: Univ. Microfilms Order No. 7911321

A new signal processing transform, the direct phase cepstrum, which was defined as the inverse Fourier transform of the complex sinusoid phase factor of the Fourier transform of a signal was introduced. Its primary use was detecting the delay times, which were manifest as impulses in the direct phase cepstrum, in a composite signal consisting of one or more echoes of the source signal. Important differences between the direct phase cepstrum and the more traditional power cepstrum were that: (1) The former is a transformation of the phase angle function of the Fourier transform of a signal, whereas the latter is a transformation of the magnitude function. (2) The logarithmic operator is used in defining the latter, while it is not used in computing the former. The practical implications of these facts were developed. Dissert. Abstr.

N79-26415# American Society of Mechanical Engineers, New York.
FLAW EVALUATION PROCEDURES
T. U. Marston Aug. 1978 370 p refs Sponsored by DOE
(EPRI-NP-719-SR) Avail: NTIS HC A16/MF A01

Appendix A, 'Evaluation of Flaw Indication,' of ASME Section XI, 'Rules for Inspection of Nuclear Power Plant Components,' contains procedures acceptable to the Boiler and Pressure Vessel Code Committee for establishing the acceptability of flaw indications found in nuclear pressure boundary components. A series of example problems that illustrate the evaluation procedures contained in Appendix A is presented. These example problems determine acceptability under all operational and test conditions, considering such factors as flaw location, flaw size, flaw growth due to normal and abnormal loads, degradation of properties due to neutron fluence, and the application of linear elastic fracture mechanics (LEFM). In addition, the technical basis for the fracture analysis methods of Appendix A is provided, with documentation of the material properties shown for reference in the appendix. DOE

N79-26416# Denver Univ., Colo. Dept. of Mathematics.
NOTE ON NON-DESTRUCTIVE DETECTION OF VOIDS BY A HIGH FREQUENCY INVERSION TECHNIQUE
Jack K. Cohen and N. Bleistein 1978 9 p refs Presented at 1st Symp. on Ultrasonic Materials Characterization, Gaithersburg, Md., 7 Jun. 1978
(Contract EY-76-S-02-2482)
(COO-2482-8; Conf-780650-8) Avail: NTIS HC A02/MF A01

An inverse method for nondestructive detection of scatterers of high contrast such as voids or strongly reflecting inclusions, is described. The phase and range normalized far field scattering amplitude is shown to be directly proportional to the Fourier transform of the characteristic function of the scatterer. The characteristic function was equal to unity inside the region occupied by the scatterer and was zero outside. Thus, knowledge of this function provides a description of the scatterer. The method was applied to flaws in a sphere. DOE

N79-26417# Central Electricity Generating Board, Bristol (England). Scientific Services Dept.
DATA REDUCTION IN THE EDDY CURRENT TESTING OF CONDENSER TUBES
M. Russell Dec. 1978 8 p refs
(TDB-314) Avail: NTIS HC A02/MF A01

The testing of condenser tubes by eddy current techniques results in a large amount of data which had previously to be processed using a highly labor-intensive and time-consuming manual technique. A complete system of data acquisition, computer processing and storage has been developed, requiring little extra training for operating staff and presenting the survey results in a fast, consistent manner. Author (ESA)

39 STRUCTURAL MECHANICS

Includes structural element design and weight analysis; fatigue; and thermal stress.

For applications see *05 Aircraft Design, Testing and Performance* and *18 Spacecraft Design, Testing and Performance*.

N79-26418 Colorado School of Mines, Golden.
A THERMAL ACTIVATION ANALYSIS OF CYCLIC CREEP IN Al-4.6% Mg Ph.D. Thesis
Thomas Leonard Rising 1978 151 p
Avail: Univ. Microfilms Order No. 7912229

A study was made of cyclic creep behavior of Al-4.6% Mg. It was determined that cyclic creep acceleration occurred due to enhanced softening of the cyclically loaded material with respect to statically loaded material. The enhanced softening was caused by the interaction of the cyclic applied stress with the recovery and strain hardening processes. This interaction had the effect of accelerating the recovery process. The accelerated recovery, in turn, was responsible for the lower average internal stress and higher average cyclic creep rate. A general nonsteady-state creep relationship based on transients of the internal stress was formulated using activation analysis. The relationship was used to construct a computer model. The model was employed to predict strain rate behavior in both statically and cyclically loaded systems. Dissert. Abstr.

N79-26419 Washington Univ., Seattle.
TEARING INSTABILITY OF ELASTIC-PLASTIC CRACK GROWTH Ph.D. Thesis
Akram Zahoor 1978 193 p
Avail: Univ. Microfilms Order No. 7913351

A criterion for predicting stable crack growth and crack instability due to ductile tearing mechanisms is investigated using J-integral and Tearing Modulus, T, concepts. A center-cracked strip of finite dimensions, which sustains J-controlled crack growth, is considered. Analyses in the linear elastic, small scale yielding, and fully plastic ranges are presented. The formulation is generalized to include the entire range of a elastic-plastic loading through the use of a single stress-strain relationship of a strain hardening material. Crack instability is strongly influenced by the system elastic compliance, and the constraint conditions, such as plane stress vs. plane strain, as well as rack stability is ensured in a plane strain situation then under the same circumstances a geometrically identical but plane stress strip will be stable. Dissert. Abstr.

N79-26420 Illinois Univ. at Urbana-Champaign.
CONCENTRATED FORCE PROBLEMS IN TRANSVERSE ISOTROPY Ph.D. Thesis
Giuliano Maria Toneatto 1978 100 p
Avail: Univ. Microfilms Order No. 7913640

The method of singularities was extended to solve the problem of a concentrated tangential unit force applied beneath the surface of a transversely isotropic medium. Additionally, the previously-solved transversely isotropic analogs of the Boussinesq, Cerruti and Mindlin problems were solved by extending the same method of singularities. The method of singularities proved to be a fairly direct and useful approach to the solution of the basic problems in a transversely isotropic medium. The relative simplicity of generating a series of singularities and their superposition to solve substantially more intricate problems makes computations a simple matter. Moreover, some physical meaning can be attached to each stage of the solution process. Dissert. Abstr.

N79-26421 Engineering Sciences Data Unit, London (England).
SINGLE DISC SPRINGS: ELASTIC DEFLECTIONS, STRESSES, STIFFNESSES AND RESILIENCES
1978 24 p
(ESDU-78043; ISBN-85679-248-9; ISSN-0141-4089)
Copyright. For information on availability of series, and other individual data items, write NTIS, Attn: ESDU, Springfield, Va. 22161. HC $578.50

The elastic deflections, stresses, stiffnesses and resilience of initially coned disc springs (Belleville washers) and initially flat discs springs are presented both in both graphic and algebraic form. Springs are dealt with that are of a rectangular section mounted either on shoulders or on flat plates, and loaded uniformly around the upper and lower edges of the section or around a radius inside the edges of the section. Typical applications include valves, clutches, forging dies, machine tools, pneumatic equipment and testing apparatus. ESDU

N79-26422 Oklahoma State Univ., Stillwater.
ANALYSIS OF RIGID PAVEMENT ON VISCOELASTIC FOUNDATION SUBJECTED TO MOVING LOADS Ph.D. Thesis
Sudipta Sankar Bandyopadhyay 1978 78 p
Avail: Univ. Microfilms Order No. 7912610

The dynamic behavior of road structure was analyzed by idealizing the subgrade with different viscoelastic models having three and four elements. Complex Fourier Transformation was used to solve the resulting differential equations. All the parameters are nondimensionalized. The results are presented in nondimensional form. A detailed study was made to determine the effect of different parameters, namely, the velocity ratio of the moving load, and elastic and viscous constants of the foundation, on the deflection and moment of the pavement. Also, the relative implication of idealizing the subgrade with different viscoelastic models was studied. Dissert. Abstr.

N79-26423 Oklahoma State Univ., Stillwater.
STUDY OF BASE PLATES FOR AXIALLY LOADED COLUMNS Ph.D. Thesis
Hussam Mohamed Fahmy Ghanem 1978 126 p
Avail: Univ. Microfilms Order No. 7912625

A reliable procedure for analyzing circular base plate systems through the entire elastic and inelastic ranges of loading was developed. A mathematical model is formulated for the base plate system that reflects the behavior of the steel base plate and the concrete footing in the actual system. The analytical study is limited to short time behavior of an axisymmetric base plate under monotonically increasing static loads. The adequacy of the proposed procedure is illustrated by comparing analytical solutions for some base plate systems with experimental results. Dissert. Abstr.

N79-26424 Miami Univ., Coral Gables, Fla.
WARPING TORSION OF REINFORCED CONCRETE BEAMS WITH THIN-WALLED OPEN SECTIONS Ph.D. Thesis

Ching-Sheng Hwang 1978 303 p
Avail: Univ. Microfilms Order No. 7911793

Reinforced concrete thin-walled girders with open sections are increasingly being utilized in transportation structures. Warping torsional resistance in addition to St. Venant's torsional resistance must be considered in analyzing such a structure. A general theoretical solution for the behavior of reinforced concrete thin-walled channel sections is presented. The theory is capable of predicting the mixed torsional response before and after cracking. The post cracking behavior was solved mathematically by a new approach utilizing Fourier Series. A computer program was written for rapid solution of this mixed torsional analysis. The effect of secondary warping was also carefully studied. The theory was verified by experimental work on two reinforced concrete channel beams. Dissert. Abstr.

N79-26425 Minnesota Univ., Minneapolis.
POLYETHYLENE DEFORMATION ANALYSIS Ph.D. Thesis
Pedro Miguel Tarinvarela 1978 144 p
Avail: Univ. Microfilms Order No. 7912091

The deformation process of polyethylene was studied with the aid of transmission electron microscopy. For a constant molecular weight, the role of crystallization temperature was characterized in terms of the extensibility of the polymer. Thin films of linear, fractionated polyethylene (thickness circa 1000 angstrom) were gold marked and deformed at room temperature in a microtensile device. The amount of deformability (natural draw ratio) was evaluated by measuring the difference in gold marker separation. The characteristics of the microfibrillar structure developed were studied with the aid of a gold decoration technique. A model of the deformation process of polyethylene was developed. The model satisfactorily explains the characteristic morphology of the microfibrillar structures (connectivity and microfibril diameter) as a function of crystallization temperature. Dissert. Abstr.

N79-26426 Illinois Univ. at Urbana-Champaign.
SOME NEW RESULTS IN THE SECOND-ORDER THEORY OF NONLINEAR THERMOELASTICITY Ph.D. Thesis
Faitori Mohamed Omer 1978 80 p
Avail: Univ. Microfilms Order No. 7913569

Particular solutions of the inhomogeneous second-order energy equations were derived. Necessary and sufficient conditions on the first-order fields in order that the various second-order fields vanish identically were obtained. The following problems were solved through second-order terms: torsion and axial heating of a cylinder of arbitrary cross-section; spherical shell with radial mechanical and thermal loading; constrained annular cylinder with internal pressure and radial thermal loading; and free whole space with prescribed time-dependent radiation. Dissert. Abstr.

N79-26427*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF TRUNCATION OF A PREDOMINANTLY COMPRESSION LOAD SPECTRUM ON THE LIFE OF A NOTCHED GRAPHITE/EPOXY LAMINATE
Edward P. Phillips Jun. 1979 27 p refs Presented at the ASTM Symp. on the Fatigue of Fibrous Composite Mater., San Francisco, 22-23 May 1979
(NASA-TM-80114) Avail: NTIS HC A03/MF A01 CSCL 20K

The fatigue behavior of a notched, graphite/epoxy (T300/5208) laminate subjected to predominantly compressive loading was explored in a series of constant-amplitude and transport wing spectrum tests. Results of these tests indicate that (1) the amount of local (near the notch) buckling allowed in the tests significantly affected fatigue life; (2) spectrum truncation of either the high- or low-load end of the spectrum produced lives greater than those obtained in the baseline, complete-spectrum test, but life was much more sensitive to truncations at the high-load end; and (3) the Palmgren-Miner linear cumulative damage theory always predicted lives much longer than the actual spectrum loading test lives. Author

N79-26428*# Martin Marietta Corp., Denver, Colo.
AN IMPEDANCE TECHNIQUE FOR DETERMINING LOW-FREQUENCY PAYLOAD ENVIRONMENTS
Kenneth R. Payne Jun. 1979 146 p refs
(Contract NAS1-14370)
(NASA-CR-3143; MCR-78-581) Avail: NTIS HC A07/MF A01 CSCL 20K

The technique presented is based on frequency domain analysis and eliminates the necessity of final eigen solution for coupled payload/booster systems. A demonstration of the technique using Titan flight data and a low frequency environment prediction for a Shuttle payload are included. Criteria and philosophy for the technique for future payloads is discussed. M.M.M.

N79-26429*# Syracuse Univ., N. Y. George Sachs Fracture and Fatigue Research Lab.
A LITERATURE REVIEW ON FATIGUE AND CREEP INTERACTION
Wen-Ching Chen [1978] 41 p refs
(Grant NGR-33-022-157)
(NASA-CR-135305; MTS-HWL-4116-776) Avail: NTIS HC A03/MF A01 CSCL 20K

Life-time prediction methods, which are based on a number of empirical and phenomenological relationships, are presented. Three aspects are reviewed: effects of testing parameters on high temperature fatigue, life-time prediction, and high temperature fatigue crack growth. M.M.M.

N79-26430# Naval Ship Research and Development Center, Bethesda, Md.
APES-FINITE ELEMENT FRACTURE MECHANICS ANALYSIS REVISED DOCUMENTATION
L. Nash Gifford Mar. 1979 57 p refs
(SF43422592)
(AD-A066246; DTNSRDC-79/023) Avail: NTIS HC A04/MF A01 CSCL 20/11

New information is given concerning the APES finite element computer program for fracture mechanics and stress analysis of two-dimensional and axisymmetric structures. Described are useful new capabilities which have been added to the program as well as the additional input parameters necessary for their application. The report takes the form of a complete revision of the appendix of the original APES documentation. Author (GRA)

N79-26431# Battelle Columbus Labs., Ohio.
EVALUATION OF EQUIVALENT INITIAL FLAWS FOR DAMAGE TOLERANCE ANNALYSIS Final Report, 30 Sep. 1977 - 30 Sep. 1978
R. C. Rice and D. Broek 30 Sep. 1978 77 p refs
(Contract N62269-77-C-0543)
(AD-A067566; BATT-G-6496; NADC-77250-30) Avail: NTIS HC A05/MF A01 CSCL 20/12

An experimental investigation was conducted to establish whether the size of the so-called equivalent initial flaw can be rationalized on the basis of the size of intermetallic particles (or clusters of such) in the material. Fatigue experiments were conducted on flat specimens with a central hole cut from 7075-T73 Al alloy plate. The size and number of intermetallic particles were measured in the regions where crack initiation was anticipated. Assuming the existence of an 'equivalent initial flaw' the fatigue life of the specimens was calculated by means of crack growth analysis. In this manner the size of the equivalent initial flaw was determined as the flaw that needs to be assumed present from the beginning to give a crack propagation life equal to the observed life of the specimen. The sizes of equivalent initial flaws so calculated did not show a correlation with number or size of intermetallic particles. Author (GRA)

N79-26432# Cornell Univ., Ithaca, N. Y. Dept. of Materials Science and Engineering.
STRESS RELAXATION IN COILED RIBBONS OF $Fe_{40}Ni_{40}P_{14}B_6$ AND $Fe_{29}Ni_{49}P_{14}B_6Si_2$
D. G. Ast and D. J. Krenitsky Jan. 1978 33 p refs
(Contract N00014-77-C-0546)
(AD-A068000; TR-3) Avail: NTIS HC A03/MF A01 CSCL 11/6

The stress relaxation at elevated temperatures in coiled ribbons of Fe-Ni base metallic glasses is calculated for both power law creep and Eyring activated flow. The results are compared with experimental data on the spring back of coiled ribbons after various anneals. Good agreement is obtained for Eyring activated

flow, but not for power law creep. Comparison with stress relaxation experiments on straight sections indicates that stress relaxation in coiled ribbons is largely due to transient creep.
Author (GRA)

N79-26433# Oak Ridge National Lab., Tenn.
APPROXIMATE METHOD OF ELASTIC-PLASTIC FRACTURE ANALYSIS FOR NOZZLE CORNER CRACKS
J. G. Merkle 3 Nov. 1978 42 p refs
(Contract W-7405-eng-26)
(NUREG/CR-0472) Avail: NTIS HC A03/MF A01

Two intermediate test vessels with inside nozzle corner cracks have been pressurized to failure. Vessel V-5 leaked without fracturing at 88 C and vessel V-9 failed by fast fracture at 24 C as expected. The nozzle corner failure strains were 6.5 and 8.4 percent, both considerably greater than pretest plane strain estimates. The inside nozzle corner tangential strains were negative, implying transverse contractions along the crack front. Therefore, both vessels were reanalyzed, considering the effects of partial transverse restraint by means of the Irwin beta/sub Ic/formula. It was possible to estimate the nozzle corner pressure-strain curve by either of two semiempirical equations, both of which agree with the elastic and fully plastic behavior of the vessels. Calculations of failure strain and fracture toughness corresponding to the measured final strain and flaw size are made for both vessels, and the results agree with the measured values. DOE

N79-26434# Argonne National Lab., Ill.
EFFECTS OF NOTCHES ON ELEVATED-TEMPERATURE, LOW-CYCLE FATIGUE BEHAVIOR OF TYPE 204 STAINLESS STEEL
D. T. Raske and P. S. Maiya Dec. 1978 23 p refs Presented at ASME meeting, San Francisco, 10 Dec. 1978
(Contract W-31-109-eng-38)
(CONF-781202-25) Avail: NTIS HC A02/MF A01

Results of an investigation into the effects of geometric stress concentrations on the elevated-temperature low-cycle fatigue behavior of type 304 stainless steel are presented. The objective was to develop a data base that could be used to verify the ASME Code Case 1592-8 design method for predicting the creep-figure behavior of structural components which contain discontinuities. In continuous cycling tests, the local strains at the notch root determined from the Code Case procedure result in fatigue life estimates that were conservative when compared to the experimental values. For tests containing a hold time at the peak tensile strain, the Code Case procedure resulted in local strains that were nearly identical to the experimentally obtained local strains, if the local stress was assumed to relax to the nominal value during the hold time. DOE

N79-26435# Danish Research Center for Applied Electronics, Hoersholm.
RANDOM VIBRATION INTRODUCTION: ENVIRONMENTS, DAMAGING EFFECTS, TESTS, TEST SPECIFICATIONS AND TEST ECONOMY
B. Bang, Bjoern Barueal Petersen, and Erik Moerup Sep. 1978 64 p Sponsored by Danish Council of Technol.
(ECR-84) Avail: NTIS HC A04/MF A01; Elektonikcentralen, Hoersholm, Den. D.Kr. 50

The random vibration signal and the character of the random vibration environment are explained briefly and some questions connected to the performance of random tests are discussed. Responses of structures to random vibration are treated from a practical and theoretical point of view. The effect of a random vibration test on some equipment is compared to that of a sinusoidal vibration test. The possibilities of converting sine vibration test requirements into random vibration test specifications are discussed. The economy of sinusoidal and random vibration tests was compared. In support of suggestions and explanations, analyses of actual vibration environments were performed with respect to signal character. Author (ESA)

N79-26436# Oxford Univ. (England). Dept. of Engineering Sciences.
ELASTIC-PLASTIC TENSION-TORSION IN A CIRCULAR BAR OF RATE-SENSITIVE MATERIAL
S. A. Meguid and J. D. Campbell 1978 31 p refs
(Grant B-RG-99009)
(OUEL-1265/78) Avail: NTIS HC A03/MF A01

A theoretical and numerical investigation of the behavior of a circular bar of elastic-viscoplastic material subjected to either proportional or non-proportional straining in tension and torsion was made. The analysis included generalization of a von Mises' yield criterion and its associated plastic flow rule. Elastic compressibility was taken into account. The stresses, strains, and loading paths were determined for four prescribed straining paths; results were obtained by solving numerically, using Crout's method with partial pivoting, a system of six simultaneous quasilinear partial differential equations of hyperbolic type. Closed-form analytical solutions were also obtained for the stresses, load, and torque corresponding to fully-plastic conditions. Interaction curves were plotted and show the relation of load and torque under these condition, for quasi-static straining and for a range of finite effective strain rates. Author (ESA)

42 GEOSCIENCES (GENERAL)

No abstracts in this category.

43 EARTH RESOURCES

Includes remote sensing of earth resources by aircraft and spacecraft; photogrammetry; and aerial photography.
For instrumentation see *35 Instrumentation and Photography*.

N79-26437 Iowa Univ., Iowa City.
REGIONAL GEOLOGIC ANALYSIS OF THE BLACK HILLS OF SOUTH DAKOTA AND WYOMING FROM REMOTE SENSING DATA Ph.D. Thesis
Kuo-Liang Pan 1978 308 p
Avail: Univ. Microfilms Order No. 7913354

Photogeological interpretation of 1:250,000 scale LANDSAT-1 of the Black Hills using conventional technique has revealed that meaningful geologic information can be obtained for large areas of dense forest cover. Landform classes, drainage systems and vegetation cover permit the delineation of four major and twenty-one smaller geomorphic subdivisions of the Black Hills. The topography revealed on the imagery by differential solar illumination is the most interpretable surface phenomenon leading to the identification of lithology and geomorphic, and structural features. The accuracy of image interpretation from high altitude aerial photography at approximately 1:120,000 scale accompanied by field checking is comparable to the accuracy of 1:50,000 scale ground mapping. Dissert. Abstr.

N79-26438 Illinois Univ. at Urbana-Champaign.
A STOCHASTIC MODEL FOR AN INTERMITTENT HYDROLOGIC PROCESS Ph.D. Thesis
Charles Darwin Morris 1978 135 p
Avail: Univ. Microfilms Order No. 7913553

A methodology was developed for the generation of intermittent, small time-interval (15-minute) precipitation. This methodology consisted of three components: a probabilistic wet-and-dry sequence component; a Markovian precipitation distribution component; and a regressive spatial-distribution component. The theory of stochastic hydrologic modeling is described and procedures by which this theory can be applied to a hydrologic time series are presented. In particular, the application of the procedures to small time-interval intermittent hydrologic processes is given. In this application, two stochastic models were formulated for the generation of small time-interval precipitation. The first model, a linear regressive model, was developed from a purely theoretical approach. The second model became more sophisticated when compared with the first one in order to model the basic underlying components of the small time-interval data. Dissert. Abstr.

N79-26439* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
CONTOUR MEASUREMENT SYSTEM Patent
James R. Currie, Ralph R. Kissel, Emsley T. Deaton, Jr., and Richard A. Campbell, inventors (to NASA) Issued 5 Jun. 1979 8 p Filed 3 Nov. 1977
(NASA-Case-MFS-23726-1; US-Patent-4,156,971; US-Patent-Appl-SN-848418; US-Patent-Class-33-174L; US-Patent-Class-33-1Q; US-Patent-Class-33-1N; US-Patent-Class-105-161; US-Patent-Class-299-1; US-Patent-Class-364-560) Avail: US Patent and Trademark Office CSCL 08I

A measurement system for measuring the departures from a straight line of discrete track sections of a track along a coal face in a mine employing a vehicle having a pair of spaced wheel assemblies which align with the track is presented. A reference arm pivotally connects between the wheel assemblies, and there is indicating means for measuring the angle of pivot between the arm and each of the wheel assemblies. The length of the device is less than the length of a track section, and thus when one of the wheel assemblies is on one track section and one is on an adjoining track section, the sum of the indicated angles will be indicative of the angle between track sections. Thus, from the length of a track section and angle, the departure of each track section from the line may be calculated.
Official Gazette of the U.S. Patent and Trademark Office

N79-26440*# Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
REMOTE SENSING PROGRAM Semiannual Status Report, 1 Dec. 1978 - 31 May 1979
Ta Liang, Arthur J. McNair, and Warren R. Philipson, Principal Investigators Jun. 1979 102 p refs ERTS
(Grant NGL-33-010-171)
(E79-10211; NASA-CR-158683; SASR-14) Avail: NTIS HC A06/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N79-26441*# Department of Agriculture, Phoenix, Ariz. Water Conservation Lab.
HCMM HEAT CAPACITY MAPPING MISSION Quarterly Progress Report, 1 Feb. - 30 Apr. 1979
Ray D. Jackson, Principal Investigator 30 Apr. 1979 1 p ERTS
(NASA Order S-40255-B)
(E79-10214; NASA-CR-158686) Avail: NTIS HC A02/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N79-26442*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
SUMMARY OF NASA AIRCRAFT (NC-130) DATA COLLECTED FOR THE AGRICULTURAL SOIL MOISTURE EXPERIMENT (ASME) DURING 1978
F. R. Brumbaugh, Principal Investigator Mar. 1979 31 p EREP
(Contract NAS9-15800)
(E79-10215; NASA-CR-160163; LEC-12892; JSC-14815) Avail: NTIS HC A03/MF A01 CSCL 08M

There are no author-identified significant results in this report.

N79-26443*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
A SIMULATION STUDY OF LARGE AREA CROP INVENTORY EXPERIMENT (LACIE) TECHNOLOGY
L. Ziegler, Principal Investigator and J. Potter May 1979 31 p ref Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E79-10216; NASA-CR-160182; JSC-14547; LEC-12180) Avail: NTIS HC A03/MF A01 CSCL 02C

The author has identified the following significant results. The LACIE performance predictor (LPP) was used to replicate LACIE phase 2 for a 15 year period, using accuracy assessment results for phase 2 error components. Results indicated that the (LPP) simulated the LACIE phase 2 procedures reasonably well. For the 15 year simulation, only 7 of the 15 production estimates were within 10 percent of the true production. The simulations indicated that the acreage estimator, based on CAMS phase 2 procedures, has a negative bias. This bias was too large to support the 90/90 criterion with the CV observed and simulated for the phase 2 production estimator. Results of this simulation study validate the theory that the acreage variance estimator in LACIE was conservative.

N79-26444*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
BRIEFING MATERIALS FOR PLENARY PRESENTATIONS: THE LACIE SYMPOSIUM
Oct. 1978 216 p refs Symp. held at Houston, Tex., Oct. 1978 Sponsored by NASA, NOAA, and USDA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 EREP
(E79-10217; NASA-TM-80444; JSC-14700) Avail: NTIS HC A10/MF A01 CSCL 02C

There are no author-identified significant results in this report.

N79-26445*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
TEN-ECOSYSTEM STUDY (TES) SITE 9, WASHINGTON COUNTY, MISSOURI Final Report
W. H. Echert, Principal Investigator Mar. 1979 84 p refs EREP
(Contract NAS9-15800)
(E79-10218; NASA-CR-160165; LEC-13000; JSC-14657) Avail: NTIS HC A05/MF A01 CSCL 02F

The author has identified the following significant results. Sufficient spectral separability exists among softwood, hardwood, grassland, and water to develop a level 2 classification and inventory. Using the tested automatic data processing technology, softwood and grassland signatures can be extended across the county with acceptable accuracy; with more dense sampling, the hardwood signature probably could also be extended. Fall was found to be the best season for mapping this ecosystem.

N79-26446*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LARGE AREA CROP INVENTORY EXPERIMENT (LACIE). SIGNATURE EXTENSION IN REMOTE SENSING
C. B. Chittineni, Principal Investigator Apr. 1979 24 p refs Sponsored by NASA, NOAA, and USDA EREP
(Contract NAS9-15800)
(E79-10219; NASA-CR-160166; JSC-14825; LEC-13189) Avail: NTIS HC A02/MF A01 CSCL 12A

There are no author-identified significant results in this report.

N79-26447*# Oregon State Univ., Corvallis. Environmental Remote Sensing Applications Lab.
SEVENTH YEAR PROJECTS AND ACTIVITIES OF THE ENVIRONMENTAL REMOTE SENSING APPLICATIONS LABORATORY (ERSAL) Annual Progress Report, 1 Apr. 1978 - 31 Mar. 1979
Gary L. Benson and Barry J. Schrumpf, Principal Investigators 31 Mar. 1979 79 p refs ERTS
(Contract NGL-38-002-053)
(E79-10220; NASA-CR-158687) Avail: NTIS HC A05/MF A01 CSCL 05B

There are no author-identified significant results in this report.

N79-26448# L N K Corp., Inc., Silver Spring, Md.
THE USE OF MODELS IN IMAGE ANALYSIS Technical Progress Report, 1 Nov. 1976 - 31 Aug. 1978
George C. Stockman and Steven H. Kopstein Wright-Patterson AFB, Ohio AFML Jan. 1979 161 p refs
(Contract F33615-76-C-0521; AF Proj. 7184)
(AD-A067166; AMRL-TR-78-117) Avail: NTIS HC A08/MF A01 CSCL 09/4

Several of the automatic components of an interactive imagery screening and target detection system are studied. Components include a module for detection of primitive image features without

model hypothesis, a module for generation of hypotheses given that a particular model for the data has been evoked by primitive feature content, and a module for testing the model generated hypotheses against the data. Only shape features extracted from boundary segments are considered in this work. Features used are straight, circular, and parabolic edge segments and points of intersection or points of high curvature on edge segments. Feature extraction algorithms are discussed. Two different model types are considered--problem reduction representations (PRR) which correspond to grammar models and iconic models which correspond to cartographic data bases. Once primitive features from an image are aligned with a potential model the model generates hypotheses about the data which can be either verified or denied. Testing of hypotheses is done via curve fitting or template matching. A new approach to registration is presented and documented via experimental results. The registration approach enables the use of cartographic data bases as models for use in image analysis and object detection. Author (GRA)

N79-26449# Aspen Corp., Germantown, Md.
LAND AND NATURAL RESOURCES MANAGEMENT: AN ANALYSIS OF SELECTED FEDERAL POLICIES PROGRAMS, AND PLANNING MECHANISMS. REPORT TO THE PRESIDENT'S INTERAGENCY TASK FORCE ON ENVIRONMENTAL DATA AND MONITORING PROGRAMS Final Report
Feb. 1979 177 p refs Sponsored in part by Geol. Survey.
(Contract EQ9AC001)
(PB-292500/6) Avail: NTIS HC A09/MF A01 CSCL 13B

The report to the President's Interagency Task Force on Environmental Data and Monitoring Programs identifies major federal land and natural resource policies and analyzes representative policy conflicts. It identifies approximately 25 agencies and more than 70 laws that influence land and natural resources policy. GRA

N79-26450# Geological Survey, Indianapolis, Ind. Water Resources Div.
WATER RESOURCES DATA FOR INDIANA, WATER YEAR 1977 Annual Report, 1 Oct. 1976 - 30 Sep. 1977
Sep. 1978 360 p
(PB-292256/5; USGS/WRD/HD-78/070;
USGS/WDR/IN-77/1) Avail: NTIS HC A16/MF A01 CSCL 08H

Records of stage, discharge, and water quality of streams; stage, contents, and water quality of lakes and reservoirs; and water levels in wells are reported. Discharge records for 191 gaging stations; stage and contents for 12 lakes and reservoirs; water quality for 31 gaging stations; and water levels for 50 observation wells are presented. Included are 124 crest-stage partial-record stations, 50 low-flow partial-record stations. GRA

N79-26451# Geological Survey, Bay Saint Louis, Miss. Gulf Coast Hydroscience Center.
DISTRIBUTED ROUTING RAINFALL-RUNOFF MODEL Final Water-Resources Investigations
David R. Dawdy, John C. Schaake, Jr., and William M. Alley Sep. 1978 153 p refs
(PB-292303/5; USGS/WRD/WRI-79/005; USGS/WRI-78/90) Avail: NTIS HC A08/MF A01 CSCL 13B

A computer program of a watershed model for routing urban flood discharges through a branched system of pipes or natural channels using rainfall as input was developed and documented. The model combines soil-moisture-accounting and rainfall-excess components developed by Dawdy and others (1972) with the kinematic-wave routing method presented by Leclerc and Schaake (1973). GRA

N79-26452# George Washington Univ., Washington, D. C. Environmental and Water Resources Program.
STUDY OF A DENSITY CELL TO MEASURE SUSPENDED LOAD Final Report
Khalid Mahmood, Tariq Niaz, and S. Aftab Jan. 1979 88 p refs
(Contract NSF INT-76-84262; Grant NSF ENG-76-82100)
(PB-292954/5; EWR-79/1) Avail: NTIS HC A05/MF A01 CSCL 08H

A density cell was tested in the Sedimentation Laboratory at the George Washington University. In the measuring scheme, an Alluvial Channels Observation Project pumping sampler withdraws a continuous point sample that is circulated through the density cell. The cell measured changes in sediment concentration by sensing the change in density of the water - sediment mixture pumped from the stream. The tests made on the unit and the results obtained are reported. GRA

N79-26453# Kansas Water Resources Research Inst., Manhattan.
IMPROVEMENT OF THE STEADY FLOATING RANDOM WALK MONTE CARLO METHOD NEAR STRAIGHT LINE AND CIRCULAR BOUNDARIES WITH APPLICATION TO GROUNDWATER FLOW Completion Report, Jul. 1975 - Jun. 1977
James H. Turner, Louis C. Burmeister, and Don W. Green Dec. 1978 104 p refs
(Contract DI-14-34-0001-6079; OWRT Proj. B-045-KAN(1))
(PB-292560/0; Contrib-198; W79-04557) Avail: NTIS HC A06/MF A01 CSCL 08H

An improvement to the floating random walk was investigated. The improvement is based upon the use of exact analytical solutions to the diffusion equation interpreted in probabilistic form. A comparison is made for a number of test cases between what is referred to as a conventional Monte Carlo procedure and the improved Monte Carlo procedure as well as to an ADI finite difference procedure. It was concluded that the improved Monte Carlo procedure is more efficient than the conventional Monte Carlo procedure in terms of computer execution time and is competitive with, and may even be superior to, the ADI finite difference procedure, in some cases. GRA

N79-26454# Office of Science and Technology, Washington, D. C.
EARTH INFORMATION FROM SPACE BY REMOTE SENSING
Bruno Augenstein, Willis H. Shapley, and Eugene B. Kolnikoff 2 Jun. 1978 50 p
(PB-292736/6) Avail: NTIS HC A04/MF A01 CSCL 08B

Policy recommendations and options for U.S. civil remote sensing activities are developed. Issues addressed include data continuity, research and development, creation of a lead agency, the role of NASA, international aspects, and public sector participation. GRA

N79-26455# Geological Survey, Lakewood, Colo. Water Resources Div.
PRESENT AND POTENTIAL SEDIMENT YIELDS IN THE YAMPA RIVER BASIN, COLORADO AND WYOMING Final Report
Edmund D. Andrews Dec. 1978 40 p refs
(PB-292677/2; USGS/WRD/WRI-79/008;
USGS/WRI-78/105) Avail: NTIS HC A03/MF A01 CSCL 08H

Average annual suspended-and total-sediment loads in stream flow were determined by the flow duration sediment transport curve method at 18 sites in the Yampa River basin, Colorado and Wyoming. These computations indicate that about 2.0 million tons of sediment are carried by the Yampa River at Deerlodge Park during an average year. The lower Little Snake River subbasin contributes about 60 percent of the total basin sediment yield, although it represents less than 35 percent of the area and supplies less than 3 percent of the streamflow. In contrast, the upland (eastern) one-third of the basin contributes only about 14 percent of the sediment yield but 76 percent of the streamflow. GRA

N79-26456# Environmental Research Inst. of Michigan, Ann Arbor. Applications Div.
AID'S REMOTE SENSING GRANT PROGRAM Final Report
Thomas W. Wagner and Donald S. Lowe Aug. 1978 119 p refs
(Contract AID/TA-C-1148)
(PB-292872/9; ERIM-111800-1-F) Avail: NTIS HC A06/MF A01 CSCL 02C

The results of a program to transfer remote sensing technology to ten developing countries are presented. The program included:

(1) awarding financial grants to investigators in developing countries; (2) providing technical assistance to those investigators; and (3) carrying out several special studies at AID's request. The ten countries that had grant projects selected on the basis of competitive proposals were Bangladesh, Bolivia, Chile, Lesotho, Pakistan, Peru, Phillippines, Sri Lanka, Thailand, and Zaire. GRA

N79-26457# Nevada Univ. System, Reno. Water Resources Center.
DIGITAL SIMULATION OF SNOWMELT RUNOFF
Robert G. Merritt Apr. 1978 118 p refs
(Contract DI-14-34-0001-7060)
(PB-293252/3; PUB-41055; W79-05091) Avail: NTIS HC A06/MF A01 CSCL 08H

A computer program was developed for snowmelt runoff simulation. The program used the physical equations describing heat budget components involved in snowmelt. The model requires initial snow depth and water equivalent estimates, along with continuous air temperature, dewpoint temperature, wind speed and shortwave and longwave radiation readings as input. If radiation observations are unavailable, the model will estimate missing components. Results show that an improved meteorologic data base is required to gain acceptable snowmelt runoff simulation with the model. GRA

N79-26458# Florida Univ., Gainesville. Water Resources Research Inst.
ANALYSIS OF RESEARCHABLE WATER PROBLEMS IN THE SOUTH ATLANTIC GULF REGION Technical Completion Report
Jul. 1979 64 p
(Contract DI-14-31-0001-9076)
(PB-293484/2; W79-05401; OWRT-X-133(9076)(1)) Avail: NTIS HC A04/MF A01 CSCL 13B

The South Atlantic-Gulf Region is generally abundantly supplied with water, both surface and underground. However, man's activities create problems of both water quantity and water quality. The effects of proper water planning and management is devastating in some instances. Systematic analysis of the water resources problems of the region by the directors of the water resources research institutes of the respective states produced the lists of major regional problems and critical research needs. GRA

N79-26459# Lake Champlain Basin Study, Burlington, Vt.
ESTIMATES OF THE ANNUAL LOADING OF TOTAL PHOSPHORUS TO LAKE CHAMPLAIN Final Report
Kenneth G. Bodgan (New York State Dept. of Environ. Conserv., Albany) Sep. 1978 61 p refs
(PB-293435/4; LCBS-18) Avail: NTIS HC A04/MF A01 CSCL 13B

Point, nonpoint, and tributary loading of phosphorus to Lake Champlain is discussed. Estimates of the total contribution each source gives to the annual phosphorus loadings are generated. The ability of New York, Vermont, and Quebec waste treatment facilities to remove phosphorus is examined. It is shown that nearly half of all phosphorus reaching the Lake comes from point sources, while the other half is generated by natural nutrient loss, poor agricultural and forestry practices, construction activity and urban runoff. GRA

N79-26460# Lake Champlain Basin Study, Burlington, Vt.
LAKE CHAMPLAIN BASIN FORESTLAND AS A SOURCE OF NONPOINT POLLUTANTS Final Report
Sep. 1978 52 p refs Prepared in cooperation with Forest Serv., Washington, D. C.
(PB-293434/7; LCBS-17) Avail: NTIS HC A04/MF A01 CSCL 13B

Timber harvesting and forest land use in the Lake Champlain Basin are discussed. Of principal concern is the impact such activities have on the water quality of basin streams, rivers and the Lake. The major cause of impaired water quality associated with forestland is sediment from roads and trails. Erosion losses depend on a host of interacting factors, including soil type, topography, weather, time of year, logging equipment and frequency of road use. Measures of erosion rates are given.GRA

N79-26461# Lake Champlain Basin Study, Burlington, Vt.
LANDS IN TRANSITION: LAKE CHAMPLAIN SHORELAND CHANGES, 1960 - 1990 Final Report
Elizabeth Humstone (Vermont State Planning Office, Burlington) May 1978 74 p refs
(PB-293431/3; LCBS-14) Avail: NTIS HC A04/MF A01 CSCL 13B

A summary of the developmental changes in New York and Vermont shoreland communities is provided. Socioeconomic relationships, land use trends, and population characteristics are examined. Land use in the New York and Vermont Lake Champlain shoreland municipalities has many similarities. Both areas are characterized by large tracts of agricultural land, expanding urban centers, and substantial shoreland development. Nearly 30% of the shoreline in New York and Vermont is developed, making it a major land use factor in the shoreland municipalities. GRA

N79-26462# Lake Champlain Basin Study, Burlington, Vt.
A LAKE CHAMPLAIN TROPHIC CLASSIFICATION SYSTEM Final Report
John VanBenschoten (Vermont State Agency of Environmental Conservation, Montpelier) Jun. 1978 58 p refs
(PB-293427/1; LCBS-10) Avail: NTIS HC A04/MF A01 CSCL 13B

A uniform trophic classification system for Lake Champlain is studied. A system which provides greater divisions than oligotrophic, mesotrophic, and eutrophic is necessary because of the diversity in lake regions. This system provides tools for measuring the degree of lake eutrophication and aids in the Lake management process. The proposed Champlain trophic state index (TSIc) is a modification of the Carlson trophic state index. Spring total phosphorus, mean secchi disc transparency, and mean chlorophyll-a values are the variables used. The TSIc is based on a ranking from 0-100, and is sensitive to changes in trophic status. GRA

N79-26463# Lake Champlain Basin Study, Burlington, Vt.
LAKE CHAMPLAIN ISLANDS REPORT Final Report
Fred Dunnington (Franklin-Grand Isle Regional Planning and Development Comm., St. Albans, Vt.) Nov. 1978 50 p refs
(PB-293441/2; LCBS-25) Avail: NTIS HC A04/MF A01 CSCL 13B

The smaller islands of Lake Champlain (those 1,000 acres or less in size) provide habitat for species of birds not found anywhere else in the area. Others serve as destination for recreationists. Twenty-two percent of the 71 islands are publically owned. Forty-nine percent are in private ownership. The remaining islands have unknown status. A comprehensive inventory of these island resources is presented. Chapters devoted to wildlife, recreation, and protection were studied. GRA

N79-26464# Lake Champlain Basin Study, Burlington, Vt.
SUITABILITY OF INPUT-OUTPUT MODELS FOR EVALUATING THE IMPACT OF PHOSPHOROUS LOADINGS TO LAKE CHAMPLAIN Final Report
John VanBenschoten (Vermont State Agency of Environ. Conservation, Montpelier) Jan. 1979 90 p refs
(PB-293442/0; LCBS-26) Avail: NTIS HC A05/MF A01 CSCL 13B

Modelling analysis and the suitability of the input-output model for evaluating the impact of phosphorous loading to Lake Champlain are reported. Several of the input-output models are applied to project trends in trophic status for Lake Champlain under two alternative management alternatives. GRA

N79-26465# Clement Associates, Inc., Washington, D. C.
THIRD REPORT OF THE TSCA INTERAGENCY TESTING COMMITTEE TO THE ADMINISTRATOR, ENVIRONMENTAL PROTECTION AGENCY
Jan. 1979 244 p refs Sponsored by EPA
(PB-293378/6) Avail: NTIS HC A11/MF A01 CSCL 06T

Chemicals tested to determine their hazards to human health or the environment are presented. The dossiers were designed to provide the committee with sufficient information on the chemicals' physical and chemical properties, exposure characteristics, and biological and environmental effects to support an informed judgment on whether they should be given priority for

testing. The substances covered are chlorobenzenes, 1,2-Dichloropropane, glycidol and its derivatives. GRA

N79-26466# Colorado State Univ., Fort Collins. Water Resources Research Inst.
INSTITUTIONAL ARRANGEMENTS FOR EFFECTIVE WATER MANAGEMENT IN COLORADO
Phillip O. Foss Nov. 1978 243 p refs
(Contracts DI-14-34-001-6006; DI-14-34-001-7011; DI-14-34-001-7012; DI-14-34-001-8006)
(PB-293647/4; Completion-88; W79-05049; OWRT-A-029-COLO(2)) Avail: NTIS HC A11/MF A01 CSCL 13B

Rapidly increasing population and industrial growth in Colorado sharply increased demands for water. In the face of these increasing demands, water supply is relatively fixed. Present occasional or isolated shortages will soon become chronic. An attempt was made to develop politically acceptable institutional arrangements for increasing the supply and for more efficient methods of utilizing present supplies. GRA

N79-26467# Environmental Research Lab., Duluth, Minn.
RESULTS OF A JOINT USA/USSR HYDRODYNAMIC AND TRANSPORT MODELING PROJECT Final Report
John F. Paul, William L. Richardson, Alexandr B. Gorstko (Rostov State Univ., USSR), and Anton A. Matveyev (Hydrochemical Inst., USSR) Feb. 1979 103 p refs
(PB-293516/1; EPA-600/3-79-015) Avail: NTIS HC A06/MF A01 CSCL 08H

The three geographical areas investigated include Lake Baikal and the Sea of Azov in the U.S.S.R. and Saginaw Bay, Lake Huron in the U.S.A. The modeling approaches ranged from those employing material and mass conservation to describe water movement to those involving solution of the complete three-dimensional hydrodynamic equations. The model calculations were compared to available data and, in all cases, reasonable agreement was obtained. GRA

N79-26468# Purdue Univ., Lafayette, Ind. Water Resources Research Center.
INTERACTIVE MULTIPLE OBJECTIVE OPTIMIZATION
Kenneth J. Musselman and Joseph J. Talavage Feb. 1979 209 p refs
(Contract DI-14-31-0001-5213; OWRT Proj. B-083-IND(10)) (PB-293211/9; PWRRC-TR-121; W79-05092) Avail: NTIS HC A10/MF A01 CSCL 08H

Decision problems often arise in which several, noncommensurate and conflicting objectives must be considered simultaneously. A general nonlinear class of these problems is investigated and a means of solving problems found in this class is developed. The results are divided into four related areas: (1) identifying properties and relationships which exist within this class of problems and which prove useful to their resolution; (2) developing a user-oriented algorithm, using these properties, to solve nonlinear multiple objective optimization problems; (3) applying the algorithm to a representative problem; and (4) modifying the algorithm to address discrete nonlinear multiple objective optimization problems. GRA

N79-26469# Canada Centre for Remote Sensing, Ottawa (Ontario).
CCRS AIRBORNE PROGRAM ASSESSMENT. VOLUME 1: ANALYSIS
Josef Cihlar Apr. 1978 43 p refs 2 Vol.
(PB-293161/6; RR-78-3-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 08F

A five-month survey of the users of airborne remote sensing data produced by the Airborne Operations of the Canada Center for Remote Sensing was undertaken. The purpose of the survey was to determine how the airborne data were used, what benefits accrued from their use, and what applications were developed to an operational level. Volume I contains an analysis of the findings. Particular attention was given to categories of users, project characteristics, and to demonstrated applications. Rudimentary statistical analyses were carried out to determine type of use, principal sensor, and benefit attributes of the airborne projects. Recommendations aimed at improving the effectiveness of the airborne data utilization were made. GRA

N79-26470# Canada Centre for Remote Sensing, Ottawa (Ontario).
CCRS AIRBORNE PROGRAM ASSESSMENT. VOLUME 2: USER REPORTS
Josef Cihlar Apr. 1978 193 p refs 2 Vol.
(PB-293162/4; RR-78-3-Vol-2) Avail: NTIS HC A09/MF A01 CSCL 08F

Results of a survey to determine how remote sensing data were used, what benefits accrued from their use, and what applications were developed to an operational level are presented. GRA

44 ENERGY PRODUCTION AND CONVERSION

Includes specific energy conversion systems, e.g., fuel cells and batteries; global sources of energy; fossil fuels; geophysical conversion; hydroelectric power; and wind power.

For related information see also *07 Aircraft Propulsion and Power, 20 Spacecraft Propulsion and Power, 28 Propellants and Fuels,* and *85 Urban Technology and Transportation.*

N79-26471 Massachusetts Univ., Amherst.
STRUCTURAL DYNAMICS, STABILITY AND CONTROL OF HIGH ASPECT RATIO WIND TURBINE GENERATORS Ph.D. Thesis
Forrest Shaffer Stoddard 1979 318 p
Avail: Univ. Microfilms Order No. 7912722

The blade dynamics and vibration of wind turbine generators with high aspect ratio (slender) blades are developed. Equations of motion are derived, and blade motions and forces are found for degrees of freedom in flapping, lead-lag, and feathering subject to gravity, crosswind, yaw rate, and axisymmetric aerodynamic forces. Tower degrees of freedom are added to assess tower loads and vibration. Significant mechanical and aeroelastic instabilities which may occur are predicted and discussed. Methods are developed, and quantitative computer programs are given, for the structural and vibration analysis of twisted, tapered, composite shell blades. The University of Massachusetts Wind Furnace 1, which is the impetus of the study, is described. Dissert. Abstr.

N79-26472 Maryland Univ., College Park.
ANALYSIS OF FLAT MIRROR V-TROUGH SOLAR CONCENTRATOR Ph.D. Thesis
Byung Chan Son 1978 263 p
Avail: Univ. Microfilms Order No. 7913704

A study of solar concentrators which utilize mirrored slats focusing onto a central receiver tube by rotation about their center lines is presented. The flat mirror slats are placed in an array whose center line lies in two planes forming a V-trough. An extensive optical analysis was made on flat mirror surfaces, using a Gaussian reflection model. The factors considered in the analysis include the distance between the mirror surface and the image plane, the solar cone angle and the surface irregularities. Based on the results of the optical analysis, a computer program was written to determine the rate of solar energy reflected from the mirror surface and reaching the receiver tube under the computer simulated weather data. The design configurations considered are the slope angle of the V-trough, the height of the receiver tube, the design sun angle, the mirror width, the size of the receiver tube, the tilt adjustments per year, the flatness of mirror surface, the yearly average concentration ratio and the geographical locations. Dissert. Abstr.

N79-26473 Stanford Univ., Calif.
PREPARATION AND PROPERTIES OF Au-(-N) A SUB X Ga SUB 1 MINUS X As-(n)GaAs SCHOTTKY-BARRIER SOLAR CELLS Ph.D. Thesis
Yie-Der Shen 1979 87 p
Avail: Univ. Microfilms Order No. 7912410

Energy band diagrams of GaAs Schottky-barrier solar cells were derived. The results indicate that, because of the properties

of heterojunctions, a barrier to holes appears in the valence band at the junction when the thickness of the AlGaAs layer is near to or larger than the Schottky-barrier depletion width. The presence of this barrier degrades collection efficiency. Calculations, however, revealed that this barrier disappears when the thickness of the AlGaAs layer is less than 1000 A and the carrier concentrations in the layers were correctly chosen. This result was confirmed by spectral response measurements. A horizontal slider liquid phase epitaxial growth system was then developed for growing high quality AlGaAs-GaAs double layers with an AlGaAs layer thickness of 150 to 500 A. Dissert. Abstr.

N79-26474* National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
ELECTROCHEMICAL CELL FOR REBALANCING REDOX FLOW SYSTEM Patent
Lawrence H. Thaller, inventor (to NASA) Issued 26 Jun. 1979 5 p Filed 9 Jun. 1978 Supersedes N78-25554 (16 - 16 p 2137)
(NASA-Case-LEW-13150-1; US-Patent-4,159,366; US-Patent-Appl-SN-914260; US-Patent-Class-429-15; US-Patent-Class-429-101) Avail: US Patent and Trademark Office CSCL 10C

An electrically rechargeable REDOX cell or battery system including one of more rebalancing cells is described. Each rebalancing cell is divided into two chambers by an ion permeable membrane. The first chamber is fed with gaseous hydrogen and a cathode fluid which is circulated through the cathode chamber of the REDOX cell is also passed through the second chamber of the rebalancing cell. Electrochemical reactions take place on the surface of insert electrodes in the first and second chambers to rebalance the electrochemical capacity of the anode and cathode fluids of the REDOX system.
Official Gazette of the U.S. Patent and Trademark Office

N79-26475* National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
METHOD OF CONSTRUCTION OF A MULTI-CELL SOLAR ARRAY Patent
Donald E. Routh, Ben R. Hollis, and William R. Feltner, inventors (to NASA) Issued 29 May 1979 4 p Filed 23 Dec. 1977 Supersedes N78-17468 (16 - 08 p 1036)
(NASA-Case-MFS-23540-1; US-Patent-4,156,309; US-Patent-Appl-SN-863773; US-Patent-Class-29-572; US-Patent-Class-29-577; US-Patent-Class-29-578; US-Patent-Class-29-580; US-Patent-Class-357-45) Avail: US Patent and Trademark Office CSCL 10A

The method of constructing a high voltage, low power, multicell solar array is described. A solar cell base region is formed in a substrate such as but not limited to silicon or sapphire. A protective coating is applied on the base and a patterned etching of the coating and base forms discrete base regions. A semiconductive junction and upper active region are formed in each base region, and defined by photolithography. Thus, discrete cells which are interconnected by metallic electrodes are formed. Official Gazette of the U.S. Patent and Trademark Office

N79-26476*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
HANDBOOK OF DATA ON SELECTED ENGINE COMPONENTS FOR SOLAR THERMAL APPLICATIONS
Jun. 1979 240 p refs Prepared for DOE
(Contract EX-76-A-29-1060)
(NASA-TM-79027; E-9822; DOE/NASA/1060-78/1) Avail: NTIS HC A11/MF A01 CSCL 10B

A data base on developed and commercially available power conversion system components for Rankine and Brayton cycle engines, which have potential application to solar thermal power-generating systems is presented. The status of the Stirling engine is discussed. For individual titles, see N79-26477 through N79-26484. S.E.S.

N79-26477*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SOLAR THERMAL POWER-CONVERSION SYSTEM
Harvey S. Bloomfield *In its* Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 3-12 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

The structure, applications, and operating concepts of solar thermal power conversion system are described. S.E.S.

N79-26478*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RANKINE-CYCLE COMPONENT CHARACTERISTICS
Thaddeus S. Mroz and M. Murray Bailey *In* its Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 13-83 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

The performance and cost data for the major components of steam and organic Rankine cycle power conversion systems are presented. Rankine cycle components discussed include: (1) steam and organic turbines; (2) reciprocating engines; (3) surface condensers; and (4) boiler feed and condensate pumps. Component designs, component development status, operating characteristics, availability, cost, and component experience factors are described. S.E.S.

N79-26479*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
BRAYTON-CYCLE COMPONENT CHARACTERISTICS
Thaddeus S. Mroz, Jack A. Heller, and Harvey S. Bloomfield *In its* Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 85-126 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

The gas turbine engine which operates on the Brayton cycle principle is described. The two basic types of Brayton gas turbine engine were developed and are presented in use: the closed cycle engine and open cycle engine. S.E.S.

N79-26480*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
STIRLING ENGINE CHARACTERISTICS
Harry M. Cameron *In its* Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 127-157 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

The Stirling engine is described for the following factors: (1) excellent fuel economy; (2) low exhaust emissions; (3) multifuel capability; (4) flat torque curve; and (5) low noise level. The Stirling cycle, free piston engines, and the seals and hydrogen containment are discussed. S.E.S.

N79-26481*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
SPEED REDUCERS-INCREASERS
Thaddeus S. Mroz *In its* Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 159-173 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

Prime movers such as steam-organic engines, gas turbines, Stirling engines, and piston engines were designed for peak efficiency at specific operating parameters. Gear systems are used to reduce or increase the output speed of the prime mover to the speed requirement of the driven machine, at the operational load. The configurations of gear systems discussed include: (1) Horizontal parallel-shaft offset; (2) Horizontal parallel-shaft in-line; (3) Horizontal right angle; (4) Vertical right angle; and (5) Epicyclic. S.E.S.

N79-26482*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
COMMERCIAL SYNCHRONOUS ALTERNATING-CURRENT GENERATORS
James H. Dunn *In its* Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 175-186 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

Different types of generator and generator system are discussed. Variable speed and constant frequency systems are described. The flux switch alternator in alternating current generators used for induction hardening was examined for industrial utilization. S.E.S.

N79-26483*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
POWER-CONVERSION SYSTEM COMPONENT SUMMATION
Thaddeus S. Mroz, M. Murray Bailey, Jack A. Haller, Harvey S. Bloomfield, Robert J. Stochl, and Robert E. Hyland *In its* Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 187-190 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

Commercial components applicable to Rankine cycle, Brayton cycle, and Stirling cycle solar thermal power generating systems were surveyed. The solar thermal power generating systems and their components are described. Data on these components are presented and include development status, availability, cost, operating constraints, operating characteristics, and experience factors. S.E.S.

N79-26484*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
CANDIDATE POWER-CONVERSION SYSTEM CYCLES, APPENDIX A
Robert J. Stochl *In its* Handbook of Data on Selected Eng. Components for Solar Thermal Appl. Jun. 1979 p 191-209 (For primary document see N79-26476 17-44)
Avail: NTIS HC A11/MF A01 CSCL 10B

The Rankine cycle, Brayton cycle, and Stirling cycle are described for solar thermal applications. The basic cycle configuration, its operation, and the basic relations for calculating cycle efficiencies and work outputs are presented. The system modifications used to increase performance over that of the basic cycle are discussed. S.E.S.

N79-26485*# Pennsylvania Univ., Philadelphia. Moore School of Electrical Engineering.
ANALYSIS AND EVALUATION OF PROCESSES AND EQUIPMENT IN TASKS 2 AND 4 OF THE LOW-COST SOLAR ARRAY PROJECT Quarterly Report, Apr. - Jul. 1978
H. Goldman and M. Wolf Nov. 1978 220 p refs Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954796)
(NASA-CR-158744; DOE/JPL-954796-78/4) Avail: NTIS HC A10/MF A01 CSCL 10A

The significant economic data for the current production multiblade wafering and inner diameter slicing processes were tabulated and compared to data on the experimental and projected multiblade slurry, STC ID diamond coated blade, multiwire slurry and crystal systems fixed abrasive multiwire slicing methods. Cost calculations were performed for current production processes and for 1982 and 1986 projected wafering techniques. Author

N79-26486*# Battelle Columbus Labs., Ohio.
MEASUREMENT TECHNIQUES AND INSTRUMENTS SUITABLE FOR LIFE-PREDICTION TESTING OF PHOTOVOLTAIC ARRAYS Final Report
G. T. Noel, V. E. Wood, V. D. McGinniss, J. A. Hassell, N. A. Richard, G. B. Gaines, and D. C. Carmichael 31 Mar. 1979 86 p refs Sponsored by NASA Prepared for JPL
(Contract JPL-954328)
(NASA-CR-158733; DOE/JPL-954328-79/12) Avail: NTIS HC A05/MF A01 CSCL 10A

The validation of a 20-year service life for low-cost photovoltaic arrays is a critical requirement in the Low-Cost Solar Array (LSA) Project. The validation is accomplished through accelerated life-prediction tests. A two-phase study was conducted to address the needs before such tests are carried out. The results and recommended techniques from the Phase 1 investigation are summarized in the appendix. Phase 2 of the study is covered in this report and consisted of experimental evaluations of three techniques selected from these recommended as a results of the Phase 1 findings. The three techniques evaluated were specular and nonspecular optical reflectometry, chemiluminescence measurements, and electric current noise measurements. G.Y.

N79-26487*# Lamar Univ., Beaumont, Tex. Dept. of Chemical Engineering.
PROCESS FEASIBILITY STUDY IN SUPPORT OF SILICON MATERIAL, TASK 1 Quarterly Technical Progress Report, Apr. - Jun. 1979
Ku-Yen Li, Keith C. Hansen, and Carl L. Yaws Jun. 1979 22 p refs Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954343)
(NASA-CR-158726; QTPR-15; DOE/JPL-954343-79/15) Avail: NTIS HC A02/MF A01 CSCL 10A

Analyses of process system properties were continued for materials involved in the alternate processes under consideration for semiconductor silicon. Primary efforts centered on physical and thermodynamic property data for dichlorosilane. The following property data are reported for dichlorosilane which is involved in processing operations for solar cell grade silicon: critical temperature, critical pressure, critical volume, critical density, acentric factor, vapor pressure, heat of vaporization, gas heat capacity, liquid heat capacity and density. Work was initiated on the assembly of a system to prepare binary gas mixtures of known proportions and to measure the thermal conductivity of these mixtures between 30 and 350 C. The binary gas mixtures include silicon source material such as silanes and halogenated silanes which are used in the production of semiconductor silicon. Author

N79-26488*# Optical Coating Lab., Inc., City of Industry, Calif. Photoelectronics Div.
SILICON SOLAR CELL PROCESS DEVELOPMENT, FABRICATION AND ANALYSIS Quarterly Report, 1 Jan. - 31 Mar. 1979
H. I. Yoo, P. A. Iles, and D. P. Tanner 31 Mar. 1979 73 p refs Prepared for DOE and JPL
(Contract JPL-955089)
(NASA-CR-158736; DOE/JPL-955089-79/4; QR-3) Avail: NTIS HC A04/MF A01 CSCL 10A

The standard solar cells (2x2 cm) from the cast silicon (HEM) showed a maximum AMO efficiency of 10.1%. Cells from the low resistivity material (0.5 ohm-cm) showed lower performance than those of the high resistivity cast silicon (3 ohm-cm), an average efficiency 9.5% versus 7.6%. Maximum AMO efficiency of the standard solar cells from the EFG (RH) ribbons was about 7.5%. The solar cells from the controlled SiC, using the displaced die, showed more consistent and better performance than those of the uncontrolled SiC ribbons, an average efficiency of 6.6% versus 5.4%. The average AMO efficiency of the standard SOC solar cells were about 6%. These were large area solar cells (an average area of 15 sq cm). A maximum efficiency of 7.3% was obtained. The SOC solar cells showed both leakage and series resistance problems, leading to an average curve fill factor of about 60%. Author

N79-26489*# Westinghouse Research and Development Center, Pittsburgh, Pa.
ARRAY AUTOMATED ASSEMBLY TASK FOR THE LOW COST SOLAR ARRAY PROJECT, PHASE 2 Quarterly Report, 1 Jan. - 31 Mar. 1979
R. B. Campbell, P. Rai-Choudhury, E. J. Seman, A. Rohatgi, J. R. Davis, J. Ostroski, and R. W. Stapleton 15 May 1979 50 p Prepared foe DOE and JPL
(Contracts NAS7-100; JPL-954873)
(NASA-CR-158727; AR-6; QR-6) Avail: NTIS HC A03/MF A01 CSCL 10A

Using silk screened evaporated and sputtered Al as the metal source, the formation of Al back surface fields was studied. The most satisfactory results were those obtained with the sputtered A1 and in which open circuit voltages (V sub oc) of 0.585 v (12 ohm cm FZ silicon) were achieved. The ultrasonic interconnect process is discussed. The process is shown to be satisfactory, but increased pull-strength may be obtained if some form of sintering is carried out on the metallized contacts. Plasma etching is shown to be feasible as a replacement for wet chemical cleaning prior to diffusion. Initial results on cells prepared by using electroless Pd/Ni plus either electroplated Ag or Cu show slightly poor performance than cells with the baseline evaporated Ti/Pd/Ag system. A mask designed for the 1.6 x 7.0 cm and 2.0 x 7.0 cm cells is described. This mask has a lower area coverage and total lower resistive loss than the previous mask design. It is also shown that the cell width should not exceed 2.0 - 3.0 cm for optimum efficiency. J.M.S.

N79-26490*# Spectrolab, Inc., Sylmar, Calif.
SILICON SOLAR CELL PROCESS DEVELOPMENT, FABRICATION AND ANALYSIS Quarterly Report. Jan. - Mar. 1979
Joseph A. Minahan Mar. 1979 54 p Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-955055)
(NASA-CR-158740; DOE/JPL-955055-78/1; QR-2) Avail: NTIS HC A04/MF A01 CSCL 10A

Solar cells were constructed from polycrystalline silicon sheet material (10 cm x 10 cm). These cells were made using conventional aerospace methods and serve as the so-called baseline cell for analysis and comparison with cells to be made from similar material, but using optimized processing techniques. Before and during the processing of the baseline cells in a cleaned diffusion tube, control cells were built using the baseline method. All cells were measured on a solar simulator at air mass zero and 28 C. Average efficiency for the baseline cells was 9.5%. Efficiency was found to vary with location in the sheet. Center regions had higher efficiencies whereas corner and edge regions had lower efficiencies. In general, the efficiency falls off with distance from the center of the sheet. Author

N79-26491*# Barry (Theodore) and Associates, Los Angeles, Calif.
SAMICS VALIDATION. SAMICS SUPPORT STUDY, PHASE 3 Final Report
Mar. 1979 145 p refs Prepared for DOE and JPL
(Contracts NAS7-100; JPL-955123)
(NASA-CR-158746; DOE/JPL-955123-79/1; JPL-9950-100) Avail: NTIS HC A07/MF A01 CSCL 10A

SAMICS provides a consistent basis for estimating array costs and compares production technology costs. A review and a validation of the SAMICS model are reported. The review had the following purposes: (1) to test the computational validity of the computer model by comparison with preliminary hand calculations based on conventional cost estimating techniques; (2) to review and improve the accuracy of the cost relationships being used by the model: and (3) to provide an independent verification to users of the model's value in decision making for allocation of research and developement funds and for investment in manufacturing capacity. It is concluded that the SAMICS model is a flexible, accurate, and useful tool for managerial decision making. G.Y.

N79-26492*# Materials Research, Inc., Centerville, Utah.
QUANTITATIVE ANALYSIS OF DEFECTS IN SILICON. SILICON SHEET GROWTH DEVELOPMENT FOR THE LARGE AREA SILICON SHEET TASK OF THE LOW-COST SOLAR ARRAY PROJECT Quarterly Progress Report, 1 Jan. - 31 Mar. 1979
R. Natesh, J. M. Smith, and H. A. Qidwai 1979 93 p refs Prepared for JPL and DOE
(Contract JPL-954977)
(NASA-CR-158738; QPR-4; MRI-269; DOE/JPL-954977-78/1) Avail: NTIS HC A05/MF A01 CSCL 10A

The various steps involved in the chemical polishing and etching of silicon samples are described. Data on twins, dislocation pits, and grain boundaries from thirty-one (31) silicon sample are also discussed. A brief review of the changes made to upgrade the image analysis system is included. G.Y.

N79-26493*# Motorola, Inc., Phoenix, Ariz. Semiconductor Group.
SOLAR CELL MODULES WITH PARALLEL ORIENTED INTERCONNECTIONS Final Technical/Cost Report
[1979] 26 p Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954716)
(NASA-CR-158742; DOE/JPL-954716-79/1) Avail: NTIS HC A03/MF A01 CSCL 10A

Twenty-four solar modules, half of which were 48 cells in an all-series electrical configuration and half of a six parallel cells by eight series cells were provided. Upon delivery of environmentally tested modules, low power outputs were discovered. These low power modules were determined to have cracked cells which were thought to cause the low output power. The cracks tended to be linear or circular which were caused by different stressing mechanisms. These stressing mechanisms were fully explored. Efforts were undertaken to determine the causes of cell fracture. This resulted in module design and process modifications. The design and process changes were subsequently implemented in production. G.Y.

N79-26494*# Springborn Labs., Inc., Enfield, Conn.
INVESTIGATION OF TEST METHODS, MATERIAL PROPERTIES, AND PROCESSES FOR SOLAR CELL ENCAPSULANTS Quarterly Progress Report, 12 Nov. 1978 - 12 Feb. 1979
Feb. 1979 21 p Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954527; JPL Proj. 6072.1)
(NASA-CR-158741; DOE/JPL-954527-79/10) Avail: NTIS HC A02/MF A01 CSCL 10A

During this quarter the technical activities were directed toward the reformulation of ethylene/vinyl acetate copolymer for use as a compound in solar cell module fabrication. Successful formulations were devised that lowered the temperature required for cure and raised the gel content. A major volatile component was also eliminated (acrylate crosslinking agent) which should aid in the production of bubble free laminates. Adhesive strengths and primers for the bonding of ethylene/vinyl acetate to supersyrate and substrate materials was assessed with encouraging results. The incorporation of silane compounds gave high bond strengths. A survey of scrim materials was also conducted. G.Y.

N79-26495*# Optical Coating Lab., Inc., City of Industry, Calif. Photoelectronics Div.
SILICON SOLAR CELL PROCESS DEVELOPMENT, FABRICATION AND ANALYSIS Quarterly Report, 1 Jan. - 31 Mar. 1979
H. I. Yoo, P. A. Iles, and D. P. Tanner 31 Mar. 1979 74 p refs Prepared for DOE and JPL
(Contract JPL-955089)
(NASA-CR-158735; DOE/JPL-955089-79/3; QR-3) Avail: NTIS HC A04/MF A01 CSCL 10A

The standard solar cells (2x2 cm) from the cast silicon heatexchanger method) showed a maximum AMO efficiency of 10.1%. Cells from low resistivity material (0.5 ohm-cm) showed lower performance than those of the high resistivity cast silicon (3 ohm-cm), an average efficiency 9.5% versus 7.6% Maximum AMO efficiency of the standard solar cells (2x2 cm) from the EFG (RH) ribbons was about 7.5%. The solar cells from controlled SiC, using the displaced die, showed more consistent and better performance than those of the uncontrolled SiC ribbons, an average efficiency of 6.6% versus 5.4% The average AMO efficiency of the standard silicon ceramic (soc) solar calls were about 6%. These were large area solar cells (an average area of 15 sq cm). A maximum efficiency of 7.3% was obtained. The SOC solar cells showed both leakage and series resistance problems, leading to an average curve fill factor of about 60%. Author

N79-26496*# Kayex Corp., Rochester, N. Y.
CONTINUOUS CZOCHRALSKI GROWTH. SILICON SHEET GROWTH DEVELOPMENT OF THE LARGE AREA SILICON SHEET TASK OF THE LOW COST SILICON SOLAR ARRAY PROJECT Quarterly Progress Report, 1 Jan. - 31 Mar. 1979
F. Merz Mar. 1979 25 p refs Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954888)
(NASA-CR-158730; QPR-6; DOE/JPL-954888-79/6; JPL-9950-109) Avail: NTIS HC A02/MF A01 CSCL 10A

During the reporting period, a successful 100 kilogram run was performed. Six ingots of 13 cm diameter were grown, ranging in size from 15.5 kg to 17.7 kg. Melt replenishment methods included both poly rod and lump feed material. Samples from each ingot were prepared for solar cell fabrication and analyses, impurity analysis, and structural studies. The furnace was converted to the 14-inch hot zone and preliminary heat runs were performed. Two sucessful runs were demonstrated, by growing 25 kg ingots from 30 kg melts. Also, a 100 kg run was attempted, utilizing the 14 inch crucible hot zone, but was

prematurely terminated due to excessive monoxide which accumulated on the viewports and a seed failure. Author

N79-26497*# MB Associates, San Ramon, Calif.
PROCESS DEVELOPMENT FOR AUTOMATED SOLAR CELL AND MODULE PRODUCTION. TASK 4: AUTOMATED ARRAY ASSEMBLY Annual Report
12 Jun. 1979 128 p Sponsored by NASA Prepared for JPL
(Contract JPL-954882)
(NASA-CR-158723; JPL-9950-110; DOE/JPL-954882-79/15; MB-R-79/06) Avail: NTIS HC A07/MF A01 CSCL 10A

A baseline sequence for the manufacture of solar cell modules was specified. Starting with silicon wafers, the process goes through damage etching, texture etching, junction formation, plasma edge etch, aluminum back surface field formation, and screen printed metallization to produce finished solar cells. The cells were then series connected on a ribbon and bonded into a finished glass tedlar module. A number of steps required additional developmental effort to verify technical and economic feasibility. These steps include texture etching, plasma edge etch, aluminum back surface field formation, array layup and interconnect, and module edge sealing and framing. R.E.S.

N79-26498*# Spectrolab, Inc., Sylmar, Calif.
ARRAY AUTOMATED ASSEMBLY, PHASE 2 Quarterly Report for 31 Mar. 1979
William E. Taylor, N. Mardesich, B. Edwards, S. Bunyan, and A. Garcia May 1979 36 p Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954853)
(NASA-CR-158728; DOE/JPL-954853-79/2) Avail: NTIS HC A03/MF A01 CSCL 10A

The baseline process sequence using nontextured square wafers was integrated. Difficulties encountered include: (1) replacement of the N-250 spray on diffusion source with PX-10 source; and (2) modification of the firing for printed silver and aluminum contracts is required to accommodate the change of wafer size and shape. Results indicate that the cells processed through the entire process sequence except laser scribe and spray on AR coating indicate the process sequence is feasible. Greater cell conversion efficiency is presented. S.E.S.

N79-26499*# Westinghouse Electric Corp., Trafford, Pa. Power Circuit Breaker Div.
DEVELOPMENT OF A PROCESS FOR A HIGH CAPACITY ARC HEATER PRODUCTION OF SILICON FOR SOLAR ARRAYS Quarterly Technical Report, Oct. 1978 - Feb. 1979
William H. Reed 1979 99 p refs Prepared for JPL and DOE
(Contract JPL-954589)
(NASA-CR-158745; DOE/JPL-954589-78/8; JPL-9950-112) Avail: NTIS HC A05/MF A01 CSCL 10A

A program was established to develop a high temperature silicon production process using existing electric arc heater technology. Silicon tetrachloride and a reductant (sodium) are injected into an arc heated mixture of hydrogen and argon. Under these high temperature conditions, a very rapid reaction is expected to occur and proceed essentially to completion, yielding silicon and gaseous sodium chloride. Techniques for high temperature separation and collection were developed. Included in this report are: test system preparation; testing; injection techniques; kinetics; reaction demonstration; conclusions; and the project status. G.Y.

N79-26500*# Aerospace Corp., El Segundo, Calif. Ivan A. Getting Labs.
LOW COST SOLAR ARRAY PROJECT: COMPOSITION MEASUREMENTS BY ANALYTICAL PHOTON CATALYSIS Quarterly Report
David G. Sutton, Luis Galvan, James Melzer, and Raymond Heidner, III Jun. 1979 22 p refs Prepared for DOE and JPL
(Contracts NAS7-100; JPL-955201)
(NASA-CR-158737; DOE/JPL-955201-79/3; JPL-9950-114; QR-3) Avail: NTIS HC A02/MF A01 CSCL 10A

The applicability of the photon catalysis technique for effecting composition analysis of silicon samples was assessed. Third quarter activities were devoted to the study of impurities in silicon matrices. The evaporation process was shown to be congruent; thus, the spectral analysis of the vapor yields the composition of the bulk sample. Qualitative analysis of metal impurities in silicon was demonstrated e part per million level. Only one atomic spectral interference was noted; however, it is imperative to maintain a leak tight system due to chemical and spectral interferences caused by the presence of even minute amounts of oxygen in the active nitrogen afterglow. G.Y.

N79-26501*# Mobil Tyco Solar Energy Corp., Waltham, Mass.
LARGE AREA SILICON SHEET BY EFG Quarterly Report, 1 Jan. - 31 Mar. 1979
15 Apr. 1979 82 p refs Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954355)
(NASA-CR-158731; QR-1; DOE/JPL-954355-79/1; JPL-9950-115) Avail: NTIS HC A05/MF A01 CSCL 10A

Influences on ribbon quality which might be caused by various materials of construction which are used in the growth furnace were assessed. At the present level of ribbon quality, which has produced 8.5% to 9.5% efficient solar cells, no particular influence of any furnace part was detected. The experiments led to the suspicion that the general environment and the somewhat unoptimized materials handling procedures might be responsible for the current variations in ribbon quality and that, therefore, continuous work with this furnace under rather more stringent environmental conditions and operating procedures could perhaps improve materials quality to some extent. The work on the multiple furnace was continued with two multiple growth runs being performed. In these runs, the melt replenishment system performed poorly and extensive modifications to it were designed to make reliable melt feeding for five ribbon growth possible. Additional characterization techniques for wide ribbons, stress measurements, and growth dynamics experiments are reported. A.R.H.

N79-26502*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
THE USE OF WIND DATA WITH AN OPERATIONAL WIND TURBINE IN A RESEARCH AND DEVELOPMENT ENVIRONMENT
Harold E. Neustadter 1979 13 p refs Presented at the Am. Meteorological Soc., Portland, Oreg., 19-21 Jun. 1979
(Contract E(49-26)-1004)
(NASA-TM-73832; DOE/NASA/1004-79/16; E-9419) Avail: NTIS HC A02/MF A01 CSCL 10A

The status of the use of wind information is presented in four areas, namely: operational control, design verification, power performance analysis, and lifetime estimation. Attention is given to some of the identified wind information needs and the steps taken to meet these needs. M.M.M.

N79-26503*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
A METHOD FOR CORRELATING PERFORMANCE DATA OF A TERRESTRIAL SOLAR CELL ARRAY
Frederick F. Simon May 1979 45 p refs Prepared for DOE
(NASA-TM-79163; DOE/NASA/20485-79/2; E-023) Avail: NTIS HC A03/MF A01 CSCL 10A

An analytical method was proposed for characterizing array power output, in the region of maximum power, as a function of environmental variables. The correlation provided a way of evaluating the output of an array under environmental conditions that differ from those encountered during testing. Power data obtained at one location was used to predict array performance at other locations. R.E.S.

N79-26504*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LARGE HORIZONTAL AXIS WIND TURBINE DEVELOPMENT
William H. Robbins and Ronald L. Thomas 1979 16 p refs Presented at the Wild Energy Innovative Systems Conf., Colo. Springs, Colo., 23-25 May 1979; sponsored by Solar Energy Res. Inst.
(Contract E(49-26)-1059)
(NASA-TM-79174; DOE/NASA/1059-79/2; E-039) Avail: NTIS HC A02/MF A01 CSCL 10A

An overview of the NASA activities concerning ongoing wind systems oriented toward utility application is presented. First-

generation-technology large wind turbines were designed and are in operation at selected utility sites. In order to make a significant energy impact, costs of 2 to 3 cents per kilowatt hour must be achieved. The federal program continues to fund the development by industry of wind turbines which can meet the cost goals of 2 to 3 cents per kilowatt hour. Lower costs are achieved through the incorporation of new technology and innovative system design to reduce weight and increase energy capture. M.M.M.

N79-26506*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
RECENT ADVANCES IN REDOX FLOW CELL STORAGE SYSTEMS
Lawrence H. Thaller 1979 10 p refs Presented at the 14th Intersoc. Energy Conversion Eng. Conf., Boston, 5-10 Aug. 1979 Prepared for DOE
(Contract EC-77-A-31-1002)
(NASA-TM-79186; DOE/NASA/1002-79/4; E-053) Avail: NTIS HC A02/MF A01 CSCL 10C

Several features which were conceived and incorporated into complete redox systems that greatly enhanced its ability to be kept in proper charge balance, to be capable of internal voltage regulation, and in general be treated as a true multicell electrochemical system rather than an assembly of single cells that were wired together, were discussed. The technology status as it relates to the two application areas of solar photovoltaic/wind and distributed energy storage for electric utility applications was addressed. The cost and life advantages of redox systems were also covered. R.E.S.

N79-26508*# General Electric Co., Philadelphia, Pa. Space Div.
AN INVESTIGATION OF THE ADHESIVE BONDING OF TEFLON SOLAR CELL COVERS
George J. Rayl 30 Apr. 1979 42 p refs
(Contract NAS3-21264)
(NASA-CR-159565; DOC-79SDS4218) Avail: NTIS HC A03/MF A01 CSCL 10A

The concept of introducing organic agents into silicone resins to stabilize these materials against the ravages of ultraviolet radiation is presented. A screening of coating materials, cover materials and ultraviolet screening agents is described. Fabrication processes were developed for the application of thin 25 micrometer coatings to Teflon. Temperature shock and temperature-humidity tests were conducted. Author

N79-26507# Committee on Energy and Natural Resources (U. S. Senate).
EXECUTIVE ENERGY DOCUMENTS
Washington GPO 1978 433 p refs Documents for Comm. on Energy and Natural Resources, 95th Congr., 2d Sess., Jul. 1978
(GPO-24-112; Publ-95-114) Avail: SOD HC

The Presidential speeches and messages from over the past eight years which document the evolution of the United States energy policy are presented. The first energy policy statements stressed the development of domestic energy sources, especially nuclear energy. Subsequent messages continued the theme of developing domestic energy resources while proposing various measures to reduce U. S. dependence on oil imports. The recent Presidential statements have stressed energy conservation. R.E.S.

N79-26508# Committee on Energy and Natural Resources (U. S. Senate).
ENERGY: FISCAL YEAR 1980 BUDGET REQUEST
Washington GPO 1979 257 p refs Hearing before the Comm. on Energy and Natural Resources, 96th Congr., 1st Sess., 7 Feb. 1979
(GPO-42-886; Publ-96-9) Avail: Comm. on Energy and Natural Resources

The proposed energy budget for the coming fiscal year was examined. The principle issue examined was whether or not the proposed budget reflected the urgency needed to solve the United States' energy problems; that is, if enough money going into the research and development ideas which will benefit the country best. R.E.S.

N79-26509# Committee on Energy and Natural Resources (U. S. Senate).
THE NATIONAL ENERGY ACT
Washington GPO 1979 601 p refs Rept. for Comm. on Energy and Natural Resources, 96th Congr., 1st Sess., Jan. 1979
(GPO-36-956; Publ-96-1) Avail: SOD HC

Highlights are presented of each of the five acts which makeup NEA: conservation, coal conversion, utility rate reform, natural gas, and tax credits. Import savings are discussed, and detailed fact sheets on the five acts are included. F.O.S.

N79-26510# SRI International Corp., Menlo Park, Calif.
A PILOT STUDY OF THE POTENTIAL FOR NAVY UTILIZATION OF SOLID WASTE DERIVED FUELS TO OFFSET FOSSIL FUELS CONSUMPTION Final Report
Arlie G. Capps, Marilyn Duffey-Armstrong, and Robert E. Freeman Jun. 1978 38 p refs
(Contract N00014-76-C-0351)
(AD-A067165) Avail: NTIS HC A03/MF A01 CSCL 13/2

A brief study was made to define problems that would be encountered in estimating potential Navy markets for various forms of waste derived fuels. Fossil fuel consumption estimates for boiler plants at several Navy activities were converted to waste derived fuel (WDF) estimates using a set of assumed rules judged technically feasible regarding boiler conversions and confirming of Fossil Fuels and WDF. The results of this first study are presented indicating Navy boilers might represent a significant market for all the WDF. A region could produce if the WDF were available in liquid as well as solid forms. The economic feasibility of conversions and WDF production are not addressed in this brief paper. Author (GRA)

N79-26511# Wisconsin Univ. - Madison. Dept. of Nuclear Engineering.
PROPOSAL TO THE UNITED STATES ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION FOR CONTINUATION OF FUSION REACTOR TECHNOLOGY STUDIES Progress Report, 1 Oct. 1977 - 1 Jul. 1978
R. W. Conn, G. L. Kulcinski, and C. W. Maynard 1978 47 p refs
(Contract ET-78-S-02-4636)
(COO-4636-1) Avail: NTIS HC A03/MF A01

Since the last progress report, concentration was on three main areas of research: (1) the study of the NUWMAK reactor design; (2) the study of rf heating for Tokamak reactors, and (3) the initiation of a tandem mirror reactor study. The initial work on the tandem mirror reactor is included as background in the technical proposal. Summaries of the work on recent assessments of lithium reserves and neutral transport codes are included. DOE

N79-26512# Sandia Labs., Albuquerque, N. Mex.
VERTICAL AXIS WIND TURBINE STATUS
C. H. Braasch and G. E. Brandvold 1978 12 p refs Presented at the Intern. Solar Energy Congr., New Delhi, 16 Jan. 1978
(Contract EY-76-C-04-0789)
(SAND-78-0397C; Conf-780114-4) Avail: NTIS HC A02/MF A01

Research and development activities on the Darriens wind turbine at Sandia Laboratories are described. DOE

N79-26513# McDonnell-Douglas Astronautics Co., Huntington Beach, Calif.
CENTRAL RECEIVER THERMAL POWER SYSTEM
Raymon W. Hallet, Jr. and Robert L. Gervais 1978 18 p Presented at Symp. on Solar Thermal Power Stations, Cologne, 11 Apr. 1978
(AED-Conf-78-212-008; Conf-7804108-4) Avail: NTIS (US Sales Only) HC A02/MF A01; DOE Depository Libraries

An overview is presented of a central receiver solar thermal electric system presently being developed. The design is distinct in that it used: (1) centrally supported, low-cost heliostats; (2) an external single pass-to-superheat receiver; and (3) a sensible heat, thermocline-type thermal storage. In its commercial version, the system is capable of producing 100 MWe and is designed to accommodate peak to intermediate plant operational modes. The principal working medium is water-steam. The system is

designed for a 30-year operational life with a 90% plant availability goal. The definition of a 10-MWe Pilot Plant is also presented. DOE

N79-26514# California Univ., Livermore. Lawrence Livermore Lab.
LLL WIND ENERGY STUDIES (OAHU)
Joseph B. Knox Jan. 1979 21 p refs Presented at Wind Energy, Here and Now Symp., Honolulu, Hawaii, 19 Dec. 1978
(Contract W-7405-eng-48)
(UCRL-82171; Conf-781239) Avail: NTIS HC A02/MF A01

The role in the National Wind Energy Program assigned to LLL is the development and verification of a site screening methodology for wind energy resources. The site screening methodology and the Oahu studies of the past three years include: (1) 3-dimensional diagnostic flow simulation over complex terrain, (2) modern statistical techniques of pattern recognition adapted to regional wind fields, and (3) remote sensing of atmospheric wind field by laser scintillation. The LLL team is to provide the DOE with a suitable site screening methodology for wind energy, and a significant data base of two years duration for the island of Oahu and eight stations selected from the University of Hawaii studies. Some of the significant results of these studies are presented. DOE

N79-26515# General Atomic Co., San Diego, Calif.
NUCLEAR CLOSED-CYCLE GAS TURBINE (GT-HTGR): A UTILITY POWER PLANT FOR THE YEAR 2000
Colin F. McDonald Nov. 1978 14 p refs Presented at 17th AIAA Aerospace Sci. Meeting, New Orleans, La., 15 Jan. 1979
(Contract EY-76-C-03-0167)
(GA-A-15184; Conf-790102-4) Avail: NTIS HC A02/MF A01

The combining of a modern power conversion system such as the closed-cycle gas turbine (CCGT) with an advanced high-temperature gas-cooled reactor (HTGR) results in a power plant well suited to projected utility needs in the late 1990's and early decades of the 21st century. Design aspects of the GT-HTGR plant in its present conceptual design stage are discussed. The established technology bases for the GT-HTGR power plant are outlined, and emphasis is placed on the design and development of the helium turbomachine. The benefits of the nuclear gas turbine power plant are presented, and it is concluded that the worldwide efforts to bring it into use should increase. DOE

N79-26516# Brookhaven National Lab., Upton, N. Y.
METAL HYDRIDE RESEARCH AND DEVELOPMENT PROGRAM AT BROOKHAVEN NATIONAL LABORATORY
J. R. Johnson and J. J. Reilly 1978 11 p refs Presented at Chem. Hydrogen Energy Systems Contracts Rev., Washington, D.C., 28 Nov. 1978
(Contract EY-76-C-02-0016)
(BNL-25215; Conf-781142-2) Avail: NTIS HC A02/MF A01

Work performed in the hydrogen materials development program at Brookhaven National Laboratory for the period from October 1, 1977 through September 30, 1978 is presented. Properties of importance in the utilization of metal hydrides as energy storage media are discussed. The subjects discussed are: the properties of ferro-titanium and chrome-titanium alloy hydrides. DOE

N79-26517# Acurex Corp., Mountain View, Calif.
DESIGN OF A 150 kWe DISTRIBUTED COLLECTOR SOLAR THERMAL POWER STATION
Gary J. Neuner 1978 23 p refs Presented at Symp. on Solar-Thermal Power Sta., Cologne, 12 Apr. 1978
(AED-Conf-78-212-013; Conf-780425-9) Avail: NTIS HC A02/MF A01

A large-scale solar energy system for generating 150 kWe of electricity is described. The solar system is to be built near Coolidge, Arizona. Using a distributed collector field of Acurex concentrating solar collectors, electricity will be used to pump irrigation water. Concentrators are oriented north-south to collect the most energy in the summer months when irrigation demand is highest. Exxon Caloria HT-43 heat-transfer oil is circulated through the collector field and heated to 590 K, then either transferred into a thermal storage tank or pumped directly to an organic Rankine-cycle turbine. Thermal storage consists of a tank, filled with Caloria HT-43 and rocks. Power generation is provided by Sundstrand organic Rankine-cycle power conversion system. Hot oil from the collector field is used to boil toluene, which in turn passes through a turbine to generate electricity. The power distribution system includes a 12.5 kV 3-phase distribution feeder to the well pumps. DOE

N79-26518# Brookhaven National Lab., Upton, N. Y.
HYDROGEN STORAGE DEVICES FOR AUTOMOBILES
G. Strickland 1978 10 p refs
(Contract EY-76-C-02-0016)
(BNL-25263) Avail: NTIS HC A02/MF A01

Three hydrogen storage devices are discussed. The first two, a cryogenic container (Dewar) of liquid hydrogen (LH2) and a pressure vessel filled with metal hydride (reservoir), were successfully demonstrated in working vehicles; whereas the third is a low-pressure container of glass microballoons containing highly pressurized hydrogen and is still in the conceptual stage. Each of these devices supplies hydrogen to an internal-combustion engine modified for hydrogen ervice. DOE

N79-26519# Argonne National Lab., Ill.
EVALUATION OF AVAILABLE MHD SEED-REGENERATION PROCESSES ON THE BASIS OF ENERGY CONSIDERATIONS
A. C. Sheth and T. R. Johnson Sep. 1978 43 p refs
(Contract W-31-109-eng-38)
(ANL/MHD-78-4) Avail: NTIS HC A03/MF A01

Of the several processes described in the literature that are capable of separating sulfur from alkali-metal sulfates, seven processes were selected as candidates for regenerating seed material for reuse in open-cycle MHD. After a brief assessment of each process, two were selected for a detailed analysis. The processes were compared on the bases of energy requirements and the amount of research work needed to develop a seed-regeneration process for MHD systems. The energy requirements given should be considered as rough values, because factors such as heat losses and component efficiency were not included in the analysis. On the basis of energy consumption, the PERC process has a slight advantage over the Tampella process; on the basis of the present state of development of various components, the Tampella process has a clear advantage. Accordingly, it was recommended that development programs be carried out for both the PERC and Tampella processes. DOE

N79-26520# Argonne National Lab., Ill.
SURVEY OF DISRUPTION AND CONSUMER COSTS RESULTING FROM A MAJOR RESIDENTIAL POWER OUTAGE
G. C. Krohm Jun. 1978 34 p refs
(Grant W-31-109-eng-38)
(ANL/EES-TM-29) Avail: NTIS HC A03/MF A01

Residential electricity customers surveyed following a major power failure in Springfield, Illinois in the spring of 1978 are reported. Data were needed on the relative importance of various household services for which electricity is used. Diaggregating demand for electrical power into its specific uses provided a better idea of how power outages of various durations, under various weather conditions, would affect the functioning of a household. Data were desired on consumer attitudes about an outage of unusual duration and at a relatively adverse time of the year. The ice storm and the damage it created on the electrical utility systems in Central Illinois are described. A brief characterization of the Springfield service is presented. Major findings conclusions about the impacts of prolonged outages on the residential sector summarized. DOE

N79-26521# Princeton Univ., N. J. Dept. of Mechanical and Aerospace Engineering.
THEORY OF THERMIONIC ENERGY CONVERTER WITH VARIABLE PLASMA ELECTRON TEMPERATURE
A. T. Yen and S. H. Lam Sep. 1978 98 p refs
(Contracts EY-76-S-02-2533; AT(11-1)-2533)
(COO-2533-10) Avail: NTIS HC A05/MF A01

A computational procedure for calculating the C-V characteristic, the plasma arc-drop and other important parameters for a cesium vapor thermionic energy converter was developed. The

original theory dealing with the constant electron temperature was extended to treat the problem for the variable electron temperature. Comparison between the two cases shows that the C-V characteristic moves generally toward the left as the electron thermal conductivity decreases, but the magnitude of the degradation appears small. DOE

N79-26522# Arizona State Univ., Tempe. Dept. of Botany and Microbiology.
WORKSHOP ON ECOLOGICAL IMPACTS OF SOLAR ENERGY CONVERSION
Duncan T. Patten 1978 26 p Workshop held at Tempe, Ariz., 11-12 May 1978
(Contract EG-77-S-02-4339)
(COO-4339-4) Avail: NTIS HC A03/MF A01

The first phase of the workshop was an attempt to prioritize the impact parameters and establish some form of research program to evaluate these impacts. The second phase was to establish priority research and program needs for monitoring the impacts of the planned Solar Thermal Power System to be constructed near Barstow, California. This monitoring and research program is to be designed to be applicable to other proposed solar powered systems and should include impacts of all phases of construction, operation, and maintenance. DOE

N79-26523# Lincoln Lab., Mass. Inst. of Tech., Lexington.
HEAT AND MASS FLOW ANALYSIS OF PACKED-BED THERMAL REGENERATORS
N. I. Hamilton Aug. 1978 110 p refs
(Contract EX-76-A-01-2295-029)
(CAES-9) Avail: NTIS HC A06/MF A01

A heat and mass flow analysis of a packed bed for thermal energy storage in an underground compressed air energy storage system is described including examination of the pressure drop across the bed, flow regime, and a parametric analysis. A cycling analysis that considers a variety of charge/discharge modes which might be required in an energy storage system is included. Problems such as radiation, heat losses, condensation, and bed irreversibility are discussed. DOE

N79-26524# California Univ., Livermore. Lawrence Livermore Lab.
ELECTRIC POWER FROM LASER FUSION: THE HYLIFE CONCEPT
M. Monsler, J. Blink, J. Hovingh, W. Meier, P. Walker, and J. Maniscalco (Exxon Research and Engineering Co., Linden, N. J.) Jun. 1978 20 p refs Presented at 13th Intersoc. Energy Conversion Engr. Conf., San Diego, Calif., 20 Aug. 1978 Revised
(Contract W-7405-eng-48)
(UCRL-81259-Rev-1; Conf-780801-40) Avail: NTIS HC A02/MF A01

A high yield lithium injection fusion energy chamber is described which can conceptually be operated with pulsed yields of several thousand megajoules a few times a second, using less than one percent of the gross thermal power to circulate the lithium. Because a one meter thick blanket of lithium protects the structure, no first wall replacement is envisioned for the life of the power plant. The induced radioactivity is reduced by an order of magnitude over solid blanket concepts. The design calls for the use of common ferritic steels and a power density approaching that of a LWR, promising shortened development times over other fusion concepts and reactor vessel costs comparable to a LMFBR. DOE

N79-26525# Lincoln Lab., Mass. Inst. of Tech., Lexington.
COMBINED PHOTOVOLTAIC AND THERMAL HYBRID COLLECTOR SYSTEMS
E. C. Kern, Jr. and M. C. Russell 1978 6 p refs Presented at IEEE Photovoltaic Specialists Conf., Washington, D. C., 5 Jun. 1978
(Contract EG-77-S-02-4577)
(COO-4577-3; Conf-780619-24) Avail: NTIS HC A02/MF A01

Solar energy collectors that produce both electric and thermal energy were investigated as an attractive alternative to individual thermal and photovoltaic collectors for certain applications and climates. Economic results from a system analysis indicate that hybrid collector systems are attractive in small buildings that have substantial heating loads. Passively cooled photovoltaic panels are best suited for structures located in regions where year-round air conditioning and small, low-grade, thermal energy demands predominate. DOE

N79-26526# Idaho National Engineering Lab., Idaho Falls.
STEAM GENERATOR COMPONENT STUDIES WITH RELAP4/MOD6
M. E. Wells Jul. 1978 74 p refs
(Contract EY-76-C-07-1570)
(CVAP-TR-78-019) Avail: NTIS HC A04/MF A01

The steam generator component with the RELAP4/MOD6, Update 3 computer code, during the blowdown phase of the loss-of-coolant accident is presented. RELAP4 steam generator component models were driven with measured boundary conditions from LOFT and Semiscale blowdown experiments, and the results were compared to test data. The sensitivity of the calculated results to steam generator model nodalization, code options, uncertainty in driving flow and changes in heat transfer coefficients was determined. Steam generator instrumentation requirements and the need for system effects studies are discussed. DOE

N79-26527# Oak Ridge National Lab., Tenn.
USE OF WASTE HEAT FROM NUCLEAR POWER PLANTS
M. Olszewski 1978 19 p refs Presented at Environ. Control Symp., Wash., D. C., 28 Nov. 1978
(Contract W-7405-eng-26)
(CONF-7811109-4) Avail: NTIS HC A02/MF A01

Utilization of power plant reject heat was studied. A brief description of the historical development of the program is given and results of recent studies are outlined to indicate the scope of present efforts. A description of a project assessing uses for reject heat from the Vermont Yankee Nuclear Station is also given. DOE

N79-26528# Sandia Labs., Albuquerque, N. Mex.
PROCEEDINGS OF THE WORKSHOP ON MECHANICAL STORAGE OF WIND ENERGY
Jan. 1979 150 p ref Workshop held at Albuquerque, N. Mex., 14 Dec. 1978
(Contract EY-76-C-04-0789)
(SAND-79-0001) Avail: NTIS HC A07/MF A01

Information is summarized on (1) flywheel interface and storage technology for photovoltaic applications; (2) a simulation model for wind energy systems; (3) planned FY 79 SERI tasks in storage and wind; (4) energy storage technology development to support the DOE wind energy program; (5) wind energy conversion system storage needs; (6) energy conversion and storage; and (7) SLA systems analysis results. DOE

N79-26529# Argonne National Lab., Ill.
HYCSOS CHEMICAL HEAT PUMP AND ENERGY CONVERSION SYSTEM Status Report
D. M. Gruen, M. Mendelsohn, I. Sheft, and G. Lamich 1978 12 p refs Presented at Hydride Contractors' Review Meeting, Wash., D. C., 28-29 Nov. 1978
(Contract W-31-109-eng-38)
(CONF-781142-7) Avail: NTIS HC A02/MF A01

An efficient and cost competitive chemical heat pump and energy conversion system driven by solar, other low grade heat sources or by fossil fuels (gas or oil) is discussed. The HYCSOS concept involves the use of two different metal hydrides with different free energies of formation enabling hydrogen to flow from one to another of the hydrides under the influence of appropriate thermal gradients. In the chemical heat pump mode, hydrogen flows between two pairs of four vessels which take the place of the generator/condenser and evaporator/absorber elements of conventional absorption refrigerators. The functions of generator/absorber and condenser/evaporator are interchanges at the end of each two minute cycle. The chemical heat pump materials are based on the AB5 alloys which combine a remarkable ability to absorb hydrogen rapidly and reversibly at moderate pressures near ambient temperatures with a large hydrogen storage capacity. DOE

N79-26530# Sandia Labs., Albuquerque, N. Mex.
SYSTEM STUDY ON THE FEASIBILITY OF A COAL-FIRED TOTAL-ENERGY PLANT (WITH SOLAR OPTIONS) FOR SANDIA LABORATORIES
S. Thunborg, Jr. and James A. Leonard Dec. 1978 26 p
(Contract EY-76-C-04-0789)
(SAND-78-0979) Avail: NTIS HC A03/MF A01

A preliminary assessment is presented of the technical and economic feasibility of a coal-fired total-energy onsite plant that could furnish much of the thermal electrical power requirements of the Department of Energy's facilities in Albuquerque, NM. A conceptual design and analysis of a solar-energy system that could be colocated with the coal-fired plant as a solar-total-energy system experiment is included. In general, the analysis indicates that a coal-fired total energy system is economically feasible. Further, the solar supplement to the coal-fired system can be an effective utilization of solar energy. However, the cost of the energy from the solar supplement will be from $7 MBTU to $13 MBTU depending on the solar supplement system used.
DOE

N79-26531# Electricite de France, Chatou. Div. Technique des Energies Nouvelles.
GEOTHERMAL HEATING WITH HEAT PUMPS [LE CHAUFFAGE GEOTHERMIQUE AVEC POMPE A CHALEUR]
1978 16 p In FRENCH Original contains color illustrations
Avail: NTIS HC A02/MF A01

The application of geothermal energy conversion to heating is described. One class of heat pumps was analyzed. Their coupling with a geothermal source allows for satisfactory heating. Performances are given. Particular attention is paid to optimal utilization given the external temperature. Author (ESA)

N79-26532# Electricite de France, Paris. Div. Conversion Electrochimique.
THE USE OF FUEL CELL ION EXCHANGE MEMBRANES IN ELECTROLYTIC CELLS [LES MEMBRANES ECHANGEUSES D'IONS DES PILES A COMBUSTIBLES]
Alain Damien and Jean-Claude Sohm (Ecole Natl. Super. d'Electrochim. et d'Electromet.) Jun. 1977 24 p refs In FRENCH
(P/539/77/23) Avail: NTIS HC A02/MF A01

Ion exchange membranes, previously used in fuel cells, were studied in order to examine their application to water electrolysis. State-of-the-art is reviewed from the bibliography, comparing this process with a classic one. Results show that only the cationic membranes are adequate for electrolytic cell use, being sufficiently resistant to heat and oxidation.
Author (ESA)

N79-26533# Electricite de France, Paris. Div. Conversion Electrochemique.
HYDROGEN ELECTRODE AND NICKEL BORIDE ALLOYS [ELECTRODE A HYDROGENE EN BORURE DE NICKEL]
Jean-Marie Gras and Pierre Blanc Sep. 1977 10 p refs In FRENCH
(P/539/77/30) Avail: NTIS HC A02/MF A01

The behavior of amorphous nickel borides used in hydrogen electrodes for 115C electrolysis under atmospheric pressure was analyzed. Results indicate cathodic overvoltages are unsteady and are similar to those obtained with nickel electrodes. Active spot wear or active surface reduction is offered as an explanation for cathodic deterioration. Author (ESA)

N79-26534# Electricite de France, Chatou.
ANALYSIS OF HELIO-THERMOELECTRICAL ENERGY CONVERSION EFFICIENCY [ANALYSE ENERGETIQUE DE LA CONVERSION HELIOTHERMO-ELECTRIQUE]
T. S. Tran Feb. 1977 136 p refs In FRENCH
(Rept-77/HP-40-241) Avail: NTIS HC A07/MF A01

The whole process of indirect conversion of solar energy to electricity is surveyed. A model of sun radiation is discussed considering sun trajectory, local time, and atmospheric as well as meteorological conditions. Optical concentration systems such as linear and punctual concentration, parabolic mirrors, sun-tracking, mirror supports and protections, automation of heliostat fields, etc., are described. Photothermic energy conversion systems are analyzed discussing the dimensioning of radiation boilers, heat-transporting fluids, and losses in solar boilers. Finally, the thermodynamic conversion end is discussed taking into consideration thermodynamic cycle alternatives, specific conversion problems, and fundamental options available. Practical examples refering to the THEM I project in France are presented.
Author (ESA)

N79-26535# Electricite de France, Chatou. Div. Etudes Generales et Methodes.
ELEMENTS FOR TECHNOLOGICAL AND ECONOMIC MODELING OF TOWER-TYPE SOLAR POWER PLANTS [ELEMENTS DE MODELISATION TECHNICO-ECONOMIQUE D'UNE CENTRALE ELECTROSOLAIRE A TOUR]
G. Manteau Jan. 1977 110 p refs In FRENCH
(P/51/76/17) Avail: NTIS HC A06/MF A01

Fixed parameters relative to the investment cost of a solar powered turbogenerator are studied. A numerical analysis is done for a type THEM 1 solar power station; the effects of certain investment cost parameters on feasibility are studied for this case. Suggestions for improvement on the design and for alternative applications of the model are offered. An optimal size for solar facilities to obtain an optimal output value vis a vis costs and foreseen demand is also discussed. Author (ESA)

N79-26536# Electricite de France, Chatou. Service Machines et Automatismes de Production.
COST/BENEFIT ANALYSIS OF A SOLAR POWER PLANT SUPPLEMENTED BY DIESEL GENERATION IN COMPARISON WITH A SOLELY DIESEL SYSTEM - OPTIMIZING FOR SIZE AND INITIAL INVESTMENT IN AN ISOLATED AREA [POSSIBILITE DE PLACEMENT ET DEMENSIONNEMENT OPTIMAL D'UNE CENTRALE ELECTROSOLAIRE A TOUR ASSOCIEE A UN DIESEL DANS UN CENTRE ISOLE]
G. Manteau Apr. 1977 29 p refs In FRENCH
(P/51/77/21) Avail: NTIS HC A03/MF A01

Economic and climatic conditions pertinent to the installation of a solar power plant are studied. The reduction of kWh cost vis a vis wholly diesel electrical energy generation is considered. The tradeoff between installation size and optimal output value is defined and identified for the two systems respectively. The study is hypothetical and is intended only as a guideline for future real market surveys. Author (ESA)

N79-26537# Electricite de France, Chatou. Service Machines et Automatismes de Production.
STUDY OF LOW OUTPUT SOLAR ENERGY POWER PLANTS [RAPPORT DE STAGE: ETUDE DE CENTRALE SOLAIRES DE FAIBLE PUISSANCE]
P. Ribiere and P. Weyland May 1977 138 p refs In FRENCH
(P/51/77/24) Avail: NTIS HC A07/MF A01

Various components used in combination with solar energy to produce a thermodynamic effect in a low output (less than or equal to 1MW) power generating system are studied in order to determine their economic feasibility. Four possible installations are envisaged and evaluated for their cost vis a vis the energy obtained. These are mini solar power plants (2.3 to 50 kw output) with fixed collectors, solar heat sinks with chemical or mechanical energy conversion, solar power plants (200 kw nominal output) with heliostat collectors, and tower-type solar power plants (for a nominal output of 1 MW). Related technologies such as bio-conversion, chemical reactors, and electrical energy storage are discussed and related to the size of the solar power plant chosen. Author (ESA)

N79-26538# Kentucky Univ., Lexington. Inst. of Mining and Minerals Research.
A KENTUCKY ENERGY RESOURCE UTILIZATION PROGRAM Semiannual Report, 1 Jan. - 30 Jun. 1978
Dec. 1978 77 p refs
(PB-292949/5; IMMR43-PR7-78) Avail: NTIS HC A05/MF A01 CSCL 08I

The extension and expansion of the program undertaken by the Institute for Mining and Minerals Research (MMR) during the 1972-1974 biennium, and further expanded during the 1974-1976 biennium is described. The IMMR is the prime

contractor for research and development to the Kentucky Department of Energy. The program is organized into three major functional categories, each with an operating division: materials, process development, and resources, recovery and reclamation. A summary of activities for each division for the reporting period is included. GRA

N79-26539# Seton, Johnson and Odell, Inc., Portland, Oreg.
ENVIRONMENTAL MANAGEMENT AND ENERGY FACILITY SITING IN THE COASTAL ZONE Final Report
25 Aug. 1978 161 p refs Prepared in cooperation with Cogan and Associates, Portland, Oreg.
(Contract EPA-68-01-3955)
(PB-292947/9) Avail: NTIS HC A08/MF A01 CSCL 10A

The issue of integrating air and water quality planning, coastal zone management, and energy facility siting activities in coastal areas of California, Oregon, and Washington was studied. The study considered exploration, extraction, refining, storage, transfer, and shipment of oil and gas; thermal power plants; and construction and fabrication yards for oil drilling equipment to be used on the outer continental shelf. After identifying problems in the regulatory process, recommendations were developed to deal with these problems and included suggestions to consolidate the state and federal environmental review procedures, reduce duplication in permit applications, and clarify interagency relationships. GRA

N79-26540# Illinois Inst. of Natural Resources, Springfield.
THE NEW RESIDENCE 1977 SOLAR HOUSE DESIGN COMPETITION
Garret Eakins and John Banks 1978 59 p
(PB-293069/1; ILLDOE-78/11) Avail: NTIS HC A04/MF A01 CSCL 13A

Solar housing designs awarded for the New Residence: 1977 are presented, in the areas of single family passive design, single family active design, and multiple family active/passive design. GRA

N79-26541# Indian Inst. of Science, Bangalore. Dept. of Aeronautical Engineering.
A LOW-COST WATER PUMPING WINDMILL USING A SAIL TYPE SAVONIUS ROTOR
S. P. Govinda Raju and M. Narasimha Jul. 1979 110 p Sponsored in part by Agency for International Development, Washington, D. C.
(PB-294413/0; Rept-79/FM/2) Avail: NTIS HC A06/MF A01 CSCL 10B

A water pumping windmill which can be built largely using materials and skills available in rural areas was designed and fabricated. The windmill uses a Savonius rotor and incorporates a novel sail type construction. The pump is of positive displacement type using the casing of a pneumatic tire for the pumping chamber. Two prototypes were constructed and these indicated a reasonable performance and reliability. GRA

N79-26542# Appropriate Technology Group, Oskaloosa, Kans.
WIND DRIVEN WATER PUMPS. ECONOMICS, TECHNOLOGY, CURRENT ACTIVITIES
Steve Blake Dec. 1978 29 p refs Prepared for Intern. Bank for Reconstruct. and Develop.
(PB-292816/6) Copyright. Avail: NTIS HC A03/MF A01 CSCL 10A

The economics and the characteristics typical of the aermotor windmill and the indigenous windmill were discussed. An emphasis was placed upon the importance of supplying this technical information to the developing countries of the world. GRA

45 ENVIRONMENT POLLUTION

Includes air, noise, thermal and water pollution; environment monitoring; and contamination control.

N79-26543# Battelle Pacific Northwest Labs., Richland, Wash.
CHARACTERIZING DISPERSION ON A CLIMATOLOGICAL BASIS
W. F. Sandusky and P. W. Nickola Jun. 1978 18 p refs Presented at Ann. Meeting of Am. Assoc. for the Adv. of Sci., Seattle, 13-17 Jun. 1978
(PNL-SA-6832; Conf-7806109-2) Avail: NTIS HC A02/MF A01

Normalized concentrations of pollutants downwind of various nuclear power reactor sites were predicted with onsite meteorological data and a computer code. These results, grouped by calendar year of meteorological data, were compared and the maximum concentrations were found to vary by a factor of approximately 5 between groups and approximately 3 within groups. Mean values of normalized concentrations of pollutant for each group were found to vary by a factor of approximately 2. Results confirmed earlier analysis by Hosler (1964) which indicated that differences in atmospheric dilution among data sites, based on the average effects of wind speed and vertical thermal stability were small. DOE

N79-26544# California Univ., Berkeley. Lawrence Berkeley Lab.
DETECTION AND MEASUREMENTS OF AIR POLLUTANTS AND CONSTITUENTS BY MILLIMETER-WAVE MICROWAVE SPECTROSCOPY
Branko Leskovar and W. F. Kolbe Aug. 1978 14 p refs Presented at IEEE Nucl. Sci. Symp., Washington, D. C., 18 Oct. 1978
(Contract W-7405-eng-48)
(LBL-7986; Conf-781033-34) Avail: NTIS HC A02/MF A01

The properties of millimeter-wave spectrometers as highly specific and sensitive experimental research tools for monitoring gaseous pollutants of interest in pollution research are presented. A spectrometer system operating at frequencies in the vicinity of 70 GHz and employing a semi-confocal Fabry-Perot resonator as the sample cell is described. The resonator is voltage tuned by means of a piezoelectric transducer which enables it to track the microwave source frequency. The operation and performance of the spectrometer are discussed and illustrated by measurments of diluted samples of sulfur dioxide. The noise from the microwave source, the absorption cell and the receiver, which ultimately limits the achievable sensitivity are discussed. DOE

N79-26545# Environmental Systems Corp., Knoxville, Tenn.
EXAMINATION OF SPECIFIC ASPECTS OF COOLING TOWER TESTING METHODOLOGY Final Report
K. R. Wilber Dec. 1978 113 p refs
(Epri Proj. 905-1-2)
(EPRI-FP-953) Avail: NTIS HC A06/MF A01

Specific aspects of improved testing methodology including instrumentation and instrumentation deployment are discussed. The accuracy of instruments commonly used for determination of wet-bulb temperature was examined along with cooling tower capability calculations based on wet-bulb temperatures measured as the air enters the cooling tower versus at ground level upwind of the tower. The data show that calculations of capability may deviate from 0 to 10%, the differences mainly attributed to consideration of recirculation of the exhausted cooling tower plume. To accommodate multiple point inlet wet-bulb temperature measurements, a data acquisition system using platinum RTD's as sensing elements was employed. Another area of examination dealt with water flow rate determination using nonreinforced and reinforced pilot tubes. Among other things, it was concluded that accurate determination of the coefficient of the pilot tube is required, since standard coefficients supplied by the pilot tube manufacturer may be in error. DOE

N79-26546# Argonne National Lab., Ill.
CONTROL OF SULFUR DIOXIDE AND PARTICULATE EMISSION IN MHD POWER SYSTEMS USING HIGH SULFUR COAL
K. E. Tempelmeyer, P. Blackburn, A. Sistino, J. Hopenfeld, and W. Spurgeon (Gilbert Associates) 28 Nov. 1978 22 p refs Presented at Environ. Control Symp., Washington, D. C., 28-30 Nov. 1978
(Contract W-31-109-eng-38)
(CONF-781109-18) Avail: NTIS HC A02/MF A01

The only air pollutant emission standards existing today are for SO2, NO/sub x/ and particulate matter. There is a high probability that MHD systems will be able to achieve not only

the present-day emission limits for the substances but will also be able to comply with anticipated future emission levels of SO/sub x/ and NO/sub x/. The built in processes for the control of SO/sub x/ and NO/sub x/ are described briefly. Particulate emissions in an MHD system will be small submicron particulate flyash particles coated with potassium sulfate, as well as potassium sulfate particles. Electrostatic precipitators and conventional baghouses may provide the means for collection of solid particulates. There is no reason to believe that the control of toxic carcinogenic and heavy metal emissions for MHD systems will represent a problem, either in effectiveness, cost, or convenience which is unique to MHD system. DOE

N79-26547# Colorado State Univ., Fort Collins.
CHARACTERIZATION OF FLY ASH FROM COAL COMBUSTION
D. F. S. Natusch 1978 15 p refs Presented at Workshop on Measurement Technol. and Characterization of Primary Sulfur Oxides Emission from Combustion Sources, Southern Pines, North Carolina, 24 Apr. 1978
(Contract EE-77-S-02-4347)
(COO-4347-4; Conf-780481-3) Avail: NTIS HC A02/MF A01

Fly ash derived from coal combustion contains predominantly spherical particles which consist of an insoluble aluminosilicate glass containing several mineral impurities. An outer layer, rich in many potentially toxic trace elements in the form of simple and complex sulfates is described. This layer, which is soluble in water, contains essentially all of the particulate sulfur present in fly ash in the form of sulfate. The actual mechanism(s) of formation of particulate sulfate salts are ill-defined but probably involve adsorption of condensation of gaseous sulfur species onto fly ash surfaces within the power plant stack system. DOE

N79-26548# Acurex Corp., Mountain View, Calif. Aerotherm Div.
PROCEEDINGS: THIRD WORKSHOP ON CATALYTIC COMBUSTION
John P. Kesselring Feb. 1979 541 p refs Workshop held at Asheville, North Carolina, 3-4 Oct. 1978
(Contract EPA-68-02-2611)
(PB-293336/4; EPA-600/7-79-038) Avail: NTIS HC A23/MF A01 CSCL 13B

The workshop served as a forum for the presentation of results of recent research in the areas of catalyst and catalytic combustion system development. The workshop provided industrial, university, and government representatives with the current state-of-the-art in the application of catalyst systems for pollution control and performance inprovement. Applications include firetube and watertube boilers and gas turbines for utility, industrial, automotive, and aircraft systems. GRA

N79-26549# Bari Univ. (Italy). Ist. di Macchine.
POTENTIAL MARINE POLLUTION FROM THE CAVTAT SHIPWRECK [L'INQUINAMENTO MARINO POSSIBILE A SEGUITO DELL'AFFONDAMENTO DELLA NAVE CAVTAT]
Andrea Dadone Mar. 1977 30 p refs In ITALIAN
Avail: NTIS HC A03/MF A01

A simplified mathematical model was prepared to calculate the rate of lead tetra ethyl marine pollution resulting from the Cavtat shipwreck near the Otranto channel. The model can be used for similar cases of marine pollution and can be extended to more complex situations provided a sea current is involved. Results show that while the pollution level near the bottom in the proximity of the ship is high, it is reduced by several orders of magnitude at the surface and near the coast. Author (ESA)

N79-26550# Fondazione Ugo Bordoni, Rome (Italy).
ITALIAN NOISE LEGISLATION: DEFECTS AND INSUFFICIENCIES OF PRESENT SITUATION [LA NORMATIVA SUL RUMORE IN ITALIAN: CARENZE E DIFFETTI DELLA ATTUALE SITUAZIONE]
Italo Barducci (Rome Univ.), Mario Cosa (Uffic. d'Igiene), Giovanni Ibba, and Marcello Nicoli (Uffic. d'Igiene) Oct. 1978 6 p ref In ITALIAN
(FUB-18-1978) Avail: NTIS HC A02/MF A01

Italian legislation on noise pollution is discussed. Technical, medical, social, and juridicial considerations are presented. Author (ESA)

N79-26551# Research Triangle Inst., Research Triangle Park, N. C.
ASSESSMENT OF THE USE OF FUGITIVE EMISSION CONTROL DEVICES Final Report
D. P. Daugherty and D. W. Coy Feb. 1979 86 p refs
(Contract EPA-68-02-2612)
(PB-292748/1; EPA-600/7-79-045) Avail: NTIS HC A05/MF A01 CSCL 13B

The efficiencies and utility consumptions expected from three fugitive emission control techniques are compared if they were applied in primary lead and copper smelters. Estimates are provided of the reduction of total suspended particulate emissions and the reduction of elemental lead emissions from smelters when fugitive control is applied. Charged fog water sprays are emphasized. Building enclosure and evacuation is used as a basis with which such water sprays are compared. Available cost and energy consumption data were used to assess the competitiveness of charged fog sprays. Charged fog sprays were found to be less efficient than building evacuation, but also less expensive and less energy intensive by about a factor of 10. Charged fog sprays cannot replace conventional smelter techniques. They are better suited for smaller scale, localized emission sources which contribute only a fraction of the fugitive particulate emissions. GRA

N79-26552# Colorado State Univ., Fort Collins. Dept. of Agricultural and Chemical Engineering.
REGULATORY WATER QUALITY MONITORING. A SYSTEMS PERSPECTIVE
Robert C. Ward Nov. 1978 33 p refs
(Contract EPA-CB-6-99-2530-A)
(PB-292756/4; EPA-600/7-78-228) Avail: NTIS HC A03/MF A01 CSCL 13B

The evolving regulatory monitoring system as it exists today is described. Regulatory monitoring purposes that were identified over the past few years are reviewed. The monitoring activities associated with regulatory monitoring are categorized and delineated. A regulatory monitoring system matrix which provides an overall perspective of the interaction between monitoring purposes and activities was developed. GRA

N79-26553# Environmental Protection Agency, New York.
FEDBAK03: A COMPUTER PROGRAM FOR THE MODELING OF FIRST ORDER CONSECUTIVE REACTIONS WITH FEEDBACK UNDER A STEADY STATE MULTIDIMENSIONAL NATURAL AQUATIC SYSTEM. PROGRAM DOCUMENTATION AND USER'S GUIDE Final Report
George A. Nossa Nov. 1978 93 p refs
(PB-292760/6; EPA-902/2-79-001) Avail: NTIS HC A05/MF A01 CSCL 13B

The computer model described is used to compute the steady-state distribution of water quality variables undergoing consecutive reactions with feedback and following first order kinetics. The program was developed in a general form but is specifically applicable to the reactions observed by nitrogenous species and the associated dissolved oxygen uptake in the natural environment. GRA

N79-26554# National Academy of Sciences - National Research Council, Washington, D. C. Subcommittee on Disinfectants and Products.
THE CHEMISTRY OF DISINFECTANTS IN WATER: REACTIONS AND PRODUCTS Final Report
Mar. 1979 201 p refs
(Contract EPA-68-10-3169)
(PB-292776/2) Avail: NTIS HC A10/MF A01 CSCL 13B

A preliminary discussion of the character of the natural organic substances from which by-products of organic disinfectants are thought to originate is presented. Subsequent sections describe the chemistry of chlorine, chloramines, halogens (bromine and iodine), chlorine dioxide, and ozone. The report contains a significant bibliography. GRA

N79-26555# Industrial Environmental Research Lab., Research Triangle Park, N. C.
CHARACTERIZATION OF THE EPA/IERL-RTP PILOT-SCALE PRECIPITATION Report, Sep. 1977 - May 1978
R. A. Lawless (Res. Triangle Inst., Research Triangle Park,

N.C.), B. E. Daniel, and G. H. Ramsey Feb. 1979 86 p refs (Contract EPA-68-02-2612)
(PB-292820/8; EPA-600/7-79-052) Avail: NTIS HC A05/MF A01 CSCL 13B

The EPA/IERL-RTP pilot scale electrostatic precipitator, a research device used for testing and verifying new precipitator concepts and models of precipitator operation is described. The basic capabilities of the precipitator, and measurements of precipitator operating characteristics which were obtained in the first months of investigation are also described. The precipitator performed to its design specifications in initial tests, and its utility as a research tool was quickly established. GRA

N79-26556# Kent State Univ., Ohio. Dept. of Biological Sciences.
EVALUATION OF ALUMINUM SULFATE FOR PHOSPHORUS CONTROL IN EUTROPHIC LAKES Report for Mar. 1978 - Sep. 1978
G. Dennis Cooke 8 Jan. 1979 58 p refs Sponsored by the Office of Water Research and Technology, Washington, D. C. (PB-292989/1; W79-04958; OWRT-A-053-OHIO(1)) Avail: NTIS HC A04/MF A01 CSCL 13B

The response of eutrophic lakes to nutrient diversion is often less than expected because many lakes have internal recycling which keeps phosphorus (P) levels high enough to continue nuisance algal blooms. For these lakes a restoration technique is required to achieve desired trophic state. The effectiveness of a hypolimnetic application of aluminum sulfate to Dollar Lake in 1974 and West Twin Lake (Ohio) in 1975 to control the release of P from anaerobic sediments is described. Lake monitoring in 1976 and 1978 supports the conclusion that alum application sharply curtailed internal P release and that P concentrations in the epilimnion and the whole lakes declined due to treatment. GRA

N79-26557# SRI International Corp., Menlo Park, Calif.
COMMUTER EXPOSURE MODELING METHODOLOGIES Final Report, Sep. 1977 - Oct. 1978
Patricia B. Simmon and Robert M. Patterson Feb. 1979 168 p refs
(Contract EPA-68-02-2754)
(PB-292995/3; EPA-600/4-79-010) Avail: NTIS HC A08/MF A01 CSCL 13B

Two methodologies for modeling commuter exposures are proposed: computer-oriented approach and a manual approach. Both modeling methodologies require that major commuter routes, or pathways, be identified and that the traffic on the remainder of the roadway network be treated as background pollutant sources. Since the majority of pathway exposure is expected to result from emissions on the pathway itself, the emissions and dispersion of non pathway source pollutant are handled in a simple fashion. Pathway traffic undergoes a more sophisticated treatment in that congestion and delay due to signalization are accounted for and emissions are computed accordingly. The methodology used to simulate the dispersion of pathway emissions utilizes three separate dispersion treatments, according to whether the roadway is limited-access, non limited access, or a street canyon. GRA

N79-26558# Environmental Protection Agency, Washington, D.C. Office of Research and Development.
RESEARCH SUMMARY--OIL SPILLS
Mark Schaefer Feb. 1979 19 p
(PB-293597/1; EPA-600/8-79-007) Avail: NTIS HC A02/MF A01 CSCL 13B

Research in the oil spills area is discussed. Current and emerging spill control technologies, the ecological effects of petroleum, and the approach to transferring information about the research program to the appropriate users are included.GRA

N79-26559# National Oceanic and Atmospheric Administration, Silver Spring, Md. Air Resources Lab.
A HISTORY OF AIR POLLUTION METEOROLOGY THROUGH 1969
Gerard A. Demarrais Jan. 1979 84 p refs
(PB-293741/5; NOAA-TM-ERL-ARL-74; NOAA-79022805) Avail: NTIS HC A05/MF A01 CSCL 13B

A brief survey of the milestones in the history of air pollution meteorology is presented. Applied research investigations, basic research investigations and air pollution disasters and specialty groups are discussed. The appendix consists of an annotated bibliography, a chronological listing of 337 original works and events. GRA

N79-26560# National Oceanic and Atmospheric Administration, Boulder, Colo. Marine Ecosystems Analysis Program Office.
THE MESA PUGET SOUND PROJECT, SEATTLE, WASHINGTON Annual Report, Fiscal Year 1977
Nov. 1978 22 p refs
(PB-293906/4; NOAA-79022705) Avail: NTIS HC A02/MF A01 CSCL 13B

The Puget Sound Project is planned to develop an understanding of the environmental impacts of human actions upon regional marine ecosystems and to predict the ecological consequences of these actions. Wastewater disposal and energy-related activities are significant in the region and are receiving special attention. Project planning currently is oriented towards critical contaminants introduced into the system by human activity. The project design concept is multidisciplinary ecosystem research. It emphasizes research efforts to increase knowledge of the kinds and degree of environmental impacts resulting from contaminant loading, the cause of these impacts, the dynamic processes influencing the fates and effects of contaminants, and the possible actions that would minimize or eliminate undesirable effects. GRA

N79-26561# Leeds and Northrup Co., North Wales, Pa.
OPTICAL INSTRUMENT FOR IN-STACK MONITORING OF PARTICLE SIZE Final Report, Oct. 1976 - Oct. 1978
A. L. Wertheimer and M. N. Trainer Feb. 1979 78 p refs
(Contract EPA-68-02-2447)
(PB-292751/5; EPA-600/2-79-032) Avail: NTIS HC A05/MF A01 CSCL 14B

A light scattering instrument for in-situ measurements of particulates in the 0.2 to 10.0 micrometer diameter size range is described. Two modes of scattering are used, each with two wavelengths of light, to generate five size fractions by volume from a distribution of particulates. One mode measures polarized light scattered in two orthogonal orientations at an angle of 90 degrees to the optical probe beam. The second mode measures light scattered in near forward angles (4 to 11 degrees). Both modes allow the extraction of size data when particles of different sizes are presented simultaneously in the sensing region. These principles were incorporated into a prototype portable stack monitor, consisting of a 1.5 meter long, 9 cm diameter insertable probe capable of withstanding temperatures up to 260 C. GRA

N79-26562# California Univ., Berkeley. Div. of Entomology and Parasitology.
AN EVALUATION OF THE EFFECTS OF GEOTHERMAL ENERGY DEVELOPMENT ON AQUATIC BIOTA IN THE GEYSERS AREA OF CALIFORNIA
Vincent H. Resh, Thomas S. Flynn, Gary A. Lamberti, and Eric McElravy Feb. 1979 63 p refs Sponsored by Interior Dept. (PB-293031/1; W79-04962; OWRT-A-063-CAL(1)) Avail: NTIS HC A04/MF A01 CSCL 13B

Analysis of the response of benthic populations and communities to past and ongoing geothermal energy development and operational practices was undertaken by means of an extensive six site sampling program on Big Sulfur Creek and a concentrated colonization study above, in, and below a heavily impacted tributary (Little Geysers Creek). Differences in species diversity were noted among the six Big Sulfur Creek sites that were selected relative to the presence or absence of natural fumaroles or hot springs and the absence or stage of geothermal energy development. Distribution and colonization patterns of a population of caddisfly, Gumaga nigricula, and especially its dominance in high silt areas, suggest that both siltation and fumarole activity may select for certain populations. GRA

N79-26563# Pratt and Whitney Aircraft Group, East Hartford, Conn. Commercial Products Div.
CHEMICAL COMPOSITION OF EXHAUST PARTICLES FROM GAS TURBINE ENGINES Final Report, Nov. 1976 - Mar. 1978
D. J. Robertson, J. H. Elwood, and R. H. Groth Feb. 1979 178 p refs

(Contract EPA-68-02-2458)
(PB-292380/3; EPA-600/2-79-041) Avail: NTIS HC A09/MF A01 CSCL 07D

The particulate emissions consisting of polynuclear aromatic compounds, phenols, nitrosamines and total organics were analyzed chemically. Polynuclear aromatic hydrocarbons (PAH) were determined by HPLC, GC/MS and NMR techniques. Phenols and nitrosamines were isolated and then measured by gas chromatographic methods utilizing flame ionization detection and nitrogen detection. No nitrosamines were found and except in a few cases, at low levels, no phenols. PAH and total organic levels decreased with increasing power setting and were more concentrated in the exhaust from the low sulfur fuel. Less than 1% of the organic matter emitted from the engine was absorbed on the particulate matter. GRA

N79-26564# Research Triangle Inst., Research Triangle Park, N. C.
LEVEL 1 ENVIRONMENTAL ASSESSMENT PERFORMANCE EVALUATION Final Report, Jun. 1977 - Oct. 1978
Eva D. Estes, Franklin Smith, and Denny E. Wagoner Feb. 1979 174 p refs
(Contract EPA-68-02-2612)
(PB-292931/3; EPA-600/7-79-032) Avail: NTIS HC A08/MF A01 CSCL 07D

The results of a two phased evaluation of level 1 environmental assessment procedures are reported. Results from Phase 1, a field evaluation of the source assessment sampling system (SASS), showed that the SASS train performed well within the desired factor of 3 Level 1 accuracy limit. Three sample runs were made with two SASS trains sampling simultaneously and from approximately the same sampling point in a horizontal duct. A Method-5 train was used to estimate the true particulate loading. The sampling systems were upstream of the control devices to ensure collection of sufficient material for comparison of total particulate, particle size distribution, organic classes, and trace elements. GRA

N79-26565# Science Applications, Inc., La Jolla, Calif.
MODEL OF ADVECTION, DIFFUSION AND CHEMISTRY OF AIR POLLUTION (MADCAP), EVALUATED AT SAN DIEGO, AIR BASIN. Final Report, Oct. 1975 - 1978
May 1978 224 p refs
(Contracts ARB-A6-210-30; ARB-A5-041-80)
(PB-292526/1; AR-R-A6-210-30-78-91) Avail: NTIS HC A10/MF A01 CSCL 04A

The derivation and application of the regional photochemical model MADCAP are presented. The model is exercised and the results are compared with measured air quality data. Sensitivity analyses are performed and the results are presented along with the input data that went into the model simulation. A complete user's manual for the MADCAP model as well as three data processors is given. GRA

N79-26566# Aeronautical Research Associates of Princeton, Inc., N. J.
PREDICTIONS OF HIGHWAY EMISSIONS BY A SECOND ORDER CLOSURE MODEL Final Report, May 1977 - Mar. 1978
M. E. Teske and W. S. Lewellan Feb. 1979 95 p refs
(Contract EPA-68-02-2285)
(PB-292703/6; EPA-600/4-79-013) Avail: NTIS HC A05/MF A01 CSCL 04A

The dispersion of sulfur hexafluoride tracer and sulfate from automobile emissions in the immediate vicinity of a highway were estimated for conditions similar to those existing during the General Motors sulfate dispersion experiment conducted at a GM test track. A second order closure model of turbulent transport in the planetary boundary layer was used to predict the steady-state dispersion under two conditions: with the mean wind and velocity component variances specified by the data or predicted with the aid of an automobile wake model. The GM measured wind data apparently suffered from low vertical velocity variance readings at the 1.5 meter height, and led to an overprediction of the SF6 levels by an average factor of 1.77 for the 18 tower collection points during the 15 test days. The correlation fell to 0.96 of the measured levels when the model also predicted the wind fields. The results indicate that close to the highway, buoyancy effects were small even in the critical case when the wind is light and aligned with the roadway. GRA

N79-26567# Environmental Protection Agency, Ann Arbor, Mich. Standards Development and Support Branch.
EXHAUST EMISSIONS AND FUEL CONSUMPTION OF A HEAVY-DUTY GASOLINE POWERED VEHICLE OVER VARIOUS DRIVING CYCLES: 361 CUBIC INCH 1966 FORD F-600
Richard Nash Aug. 1978 24 p
(PB-293529/4; HDV-78-08) Avail: NTIS HC A02/MF A01 CSCL 21D

Tests were run on a chassis dynamometer over various cycles. The test sequence was designed to investigate in detail the effect of various driving cycles upon vehicle emissions and fuel consumption. For this reason, road load drag force was not varied. For each driving cycle three tests were run with the vehicle in a fully warmed-up condition. The final phase was a sequence of four tests to investigate cold and warm start effects. GRA

N79-26568# Midwest Research Inst., Kansas City, Mo.
CHEMICAL TECHNOLOGY AND ECONOMICS IN ENVIRONMENTAL PERSPECTIVE. TASK 1: ANALYSIS OF THE SOURCES OF PHOSPHORUS IN THE ENVIRONMENT Final Report
Charles E. Mumma, Fred C. Hopkins, Kathryn Bohannon, and Thomas W. Lapp Mar. 1979 224 p refs
(Contract EPA-68-01-3896)
(PB-293376/0; EPA-560/2-79-002) Avail: NTIS HC A10/MF A01 CSCL 13B

A qualitative and quantitative assessment of the principal sources of phosphorus release to the environment was performed. Nonpoint sources were identified by land use; discharge data for specific land uses were obtained from the literature. Point sources were estimated on the basis of model flow diagrams and phosphorus material balances; no measured levels were utilized. The total national phosphorus emissions to air and water in 1978 were about 2.9 million metric tons. From the data developed for the national emissions, a regional assessment was performed for Florida to evaluate the difference in phosphorus sources in regions and for the nation. A cursory analysis was also performed of detergent phosphate controls in Indiana and New York. The analysis addressed surface water geography, location and nature of phosphorus water quality problems, and the impact of detergent phosphate control. GRA

N79-26569# GCA Corp., Bedford, Mass. Technology Div.
PRELIMINARY ENVIRONMENTAL ASSESSMENT OF THE LIGNITE-FIRED CAFB Final Report, Jan. 1977 - Oct. 1978
A. S. Werner, C. W. Young, William Piispanen, and B. M. Myatt Feb. 1979 257 p refs
(Contract EPA-68-02-2632)
(PB-293225/9; GCA-TR-78-34-G; EPA-600/7-79-048) Avail: NTIS HC A12/MF A01 CSCL 13B

Results of a preliminary environmental assessment (EA) of the lignite-fired Chemically Active Fluid-Bed (CAFB) process are given. It follows an earlier EA of the oil-fired CAFB. Waste streams contributing air and solid waste pollutants were evaluated in terms of emission rates and potential environmental effects. Emphasis is placed on flue gas emissions. A field sampling and laboratory analysis program was carried out to compile an emissions inventory of a CAFB pilot plant in Abington, England. An economic evaluation of the oil-fired CAFB is presented relative to alternative residual oil utilization techniques. Recommendations are made to further control needs and emissions testing to be carried out in conjunction with the CAFB demonstration plant in San Benito, Texas. GRA

N79-26570# Environmental Monitoring and Support Lab., Research Triangle Park, N. C.
AIR QUALITY DATA FOR METALS 1975 FROM THE NATIONAL AIR SURVEILLANCE NETWORK Final Report
Raymond C. Rhodes, Donald H. Fair, J. E. Frazer, S. J. Long, and W. A. Loseke Oct. 1978 117 p
(PB-293106/1; EPA-600/4-78-059) Avail: NTIS HC A06/MF A01 CSCL 13B

Particulate pollutant data gathered during calendar year 1975

provide the basis for listing the urban and nonurban concentrations of 11 metallic components of suspended particulate matter. The data are presented as a composite concentration value for each site for each of the four quarters of the calendar year. GRA

N79-26571# Environmental Sciences Research Lab., Research Triangle Park, N.C. Atmospheric Chemistry and Physics Div.
OXIDANT FORMULATION IN THE GENERATION OF OZONE
Bruce W. Gay, Jr., George R. Namie, and Joseph J. Bufalini Feb. 1979 25 p refs
(PB-293269/7; EPA-600/3-79-016) Avail: NTIS HC A02/MF A01 CSCL 07D

Ozone samples generated by UV photolysis and silent electric discharge upon air or oxygen were examined to determine if other oxidants were formed. Chemical and physical methods (IR and UV spectroscopy) failed to show the presence of such oxidants. Absence of such oxidants was also indicated by the excellent agreement between analytical results from UV photometry and gas phase titration. Ozone measurements by the colorimetric 1 percent neutral buffered potassium iodide method were biased 10-30 percent positive compared to UV photometry. A colorimetric method employing a solution of cyclohexene-dimethanol and ferrous ammonium sulfate (CHD) proved to have a different stoichiometry in the presence and absence of oxygen. GRA

N79-26572# Abcor, Inc., Wilmington, Mass. Walden Div.
GROWTH EFFECTS OF MAJOR LAND USE PROJECTS (WASTEWATER FACILITIES). VOLUME 2: SUMMARY, PREDICTIVE EQUATIONS AND WORKSHEETS
Peter H. Guldberg and Ralph B. DAgostino May 1978 211 p refs
(Contract EPA-68-02-2594)
(PB-293229/1; C-921-Vol-2; EPA-450/3-78-014B) Avail: NTIS HC A10/MF A01 CSCL 13B

The development of predictive equations for the induced land use from wastewater major projects is presented. The predictive equations were included in an impact assessment procedure that estimated the total air pollutant emissions associated with induced development from a wastewater major project. GRA

N79-26573# Washington State Dept. of Ecology, Olympia. Air Programs Div.
WASHINGTON STATE AIR MONITORING DATA FOR 1977
Jun. 1978 63 p
(PB-293085/7; DOE-78/7) Avail: NTIS HC A04/MF A01 CSCL 13B

Results of a program of continuous surveillance of air quality in Washington State are reported. The distribution of air monitoring sites, boundaries of air quality control regions, and areas not meeting national air quality standards are listed. Sampling procedures and air quality standards are described along with the telemetry system and station coding. Meteorological and climatological data are given. Air quality data are summarized by pollutant in tabular form. J.M.S.

N79-26574# Rockwell International Corp., Creve Couer, Mo. Environmental Monitoring and Services Center.
REGIONAL AIR POLLUTION STUDY, EMISSION INVENTORY SUMMARIZATION Final Report
Fred E. Littman Jan. 1979 103 p refs
(Contract EPA-68-02-2093)
(PB-293164/0; EPA-600/4-79-004) Avail: NTIS HC A06/MF A01 CSCL 13B

As part of the Regional Air Pollution Study (RAPS), data for an air pollution emission inventory were summarized for point and area sources in the St. Louis air quality control region. Data for point sources were collected for criteria and noncriteria pollutants hydrocarbons, sulfur trioxide, particle size distribution, and heat. For area sources, data were collected on criteria pollutants, hydrocarbons and heat. All the data were entered into the RAPS data bank. Hourly values are available for all point sources; locations were identified by UTM coordinates (zone 15) to within + or - 10 m. Area sources were assigned to a network of 1989 grid squares of variable size. The emission inventory was applicable for the years 1975 and 1976 and complements the RAPS aeromatic data. GRA

N79-26575# Aerospace Corp., Los Angeles, Calif. Environment and Energy Conservation Div.
DISPOSAL OF BY-PRODUCTS FROM NONREGENERABLE FLUE GAS DESULFURIZATION SYSTEMS Final Report, Dec. 1972 - Mar. 1978
J. Rossoff, R. C. Rossi, R. B. Fling, W. M. Graven, and P. P. Leo Feb. 1979 183 p refs
(Contract EPA-68-02-1010)
(PB-293163/2; EPA-600/7-79-046) Avail: NTIS HC A09/MF A01 CSCL 13B

Untreated and treated wastes from 10 different scrubbers at eastern and western plants using lime, limestone, and double-alkali processes were characterized. Concentrations of salts and trace elements in the wastes were discussed and related to the potential for water pollution. Disposal by ponding, landfilling of chemically fixed wastes, ponding with underdrainage, and conversion to gypsum was assessed. Disposal cost estimates for a 1000 MW eastern plant are 0.55, 0.90, and 1.20 mills/kWh for ponding on indigenous clay, ponding with liner added, and chemical treatment/ landfill, respectively. GRA

N79-26576# Lake Champlain Basin Study, Burlington, Vt.
EROSION AND SEDIMENTATION NONPOINT POLLUTION SOURCES AND CONTROLS, LAPLATTE RIVER WATERSHED Final Report
Sep. 1978 80 p refs Prepared by Soil Conservation Serv., Burlington, Vt.
(PB-293436/2; LCBS-19) Avail: NTIS HC A05/MF A01 CSCL 13B

Rural nonpoint sources of nutrients and sediments are recognized as major contributors to pollution and accelerated eutrophication in Lake Champlain. Surface run-off from developed and agricultural land, polluted ground water flow and soil erosion all contribute to water quality problems in the lake. Erosion from various land uses, streambanks, roadbanks, and construction sites were studied. Sediment delivery from these sources, of a watershed (the LaPlatte River) and its receiving bay (Shelburne Bay) was investigated. GRA

N79-26577# Gilbert Associates, Inc., Reading, Pa.
TYPICAL COSTS FOR ELECTRIC ENERGY GENERATION AND ENVIRONMENTAL CONTROLS Final Report, Apr. - Nov. 1978
M. G. Klett Jan. 1979 30 p refs
(Contract EPA-68-02-2605)
(PB-293502/1; EPA-600/7-79-026) Avail: NTIS HC A03/MF A01 CSCL 13B

Typical costs for electric power generating plants and their environmental controls are given for installations of 1000 and 5000 MWe capacity, including the expected range of uncertainty. Total annualized costs for a particular configuration can be computed by adding the appropriate incremental costs for fuel and environmental control equipment to the cost of the base generation system. Fixed charges were computed on the basis of 18% of the capital investment; cost data were corrected to mid-1975. Two examples of the use of the data were included. The data and method were intended to provide an overview. Actual installation costs may differ widely from those found from information in this report because of site-specific considerations. GRA

N79-26578# Kansas Water Resources Research Inst., Manhattan.
KANSAS RIVER LIMNOLOGY: SEASONAL VARIATIONS IN PHOTOSYNTHETIC PRODUCTION AND HEAVY METAL ACCUMULATION BY AQUATIC INSECTS Project Report, 1 Jul. 1976 - 31 Mar. 1978
G. Richard Marzolf Jan. 1979 62 p refs
(Contract DI-14-34-0001-7035)
(PB-293604/5; Contrib-207; W79-05234; OWRT-A-078-1CAN(1)) Avail: NTIS HC A04/MF A01 CSCL 13B

The following topics are addressed: (1) the control of photosynthesis in the Kansas River by hydraulic events and turbidity, a geometric model and some field observations; (2) the effect of increased reservoir outflow on algal biomass and

photosynthetic oxygen production in the Kansas River; (3) seasonal variation in photosynthetic oxygen production and some preliminary measurements of metals in aquatic insects; and (4) metal concentrations in aquatic insects. GRA

N79-26579# Environmental Sciences Research Lab., Research Triangle Park, N.C. Atmospheric Chemistry and Physics Div.
HYDROCARBONS IN HOUSTON AIR Report, Sep. 1973 - Apr. 1974
William A. Lonneman, George R. Namie, and Joseph J. Bufalini Feb. 1979 44 p refs
(PB-293226/7; EPA-600/3-79-018) Avail: NTIS HC A03/MF A01 CSCL 07D

Ambient air samples were collected in Houston downtown and industrial areas to determine hydrocarbon composition and concentrations. Twenty-one samples were collected on three days of sampling: September 1, 1973, and January 30 and April 2, 1974. The results of the detailed hydrocarbon analyses of these samples suggest that both vehicular and industrial sources of hydrocarbons are important. Some of these samples were collected during periods of extremely stagnated meteorological conditions. It was observed that although the total nonmethane hydrocarbons were high, they did not exceed 10 ppmC. Measurements of nitrogen oxides were made for some of these samples. These samples suggested that the NMHC/NOx ratio in the Houston area was not atypical, usually ranging from 10/1 to 20/1. GRA

N79-26580# Environmental Sciences Research Lab., Research Triangle Park, N.C.
NON-URBAN HYDROCARBON CONCENTRATIONS IN AMBIENT AIR NORTH OF HOUSTON, TEXAS Progress Report, Jan. - Apr. 1978
Robert L. Seila Feb. 1979 38 p refs
(PB-293227/5; EPA-600/3-79-010) Avail: NTIS HC A13/MF A01 CSCL 07D

In January 1978, a study was undertaken at Jones State Forest, to determine the concentrations of nonmethane hydrocarbons, methane, and carbon monoxide; to detail the composition of hydrocarbons (especially of the vegetation); and to discover the sources of nonmethane hydrocarbons. The can samples showed lower nonmethane hydrocarbon concentration values than did the bag samples. Sources of paraffins and the other hydrocarbons were vehicular exhaust (35%), the forest's vegetation (2%), the city of Houston (22%), and the region between Houston and the forest (32%). Isoprene and alpha-pinene were the vegetative hydrocarbons noted, with the latter showing a distinctive 24-hour cycle of concentration variation. GRA

N79-26581# Southern Research Inst., Birmingham, Ala.
PROCEEDINGS: ADVANCES IN PARTICLES SAMPLING AND MEASUREMENT Report, Jan. 1977 - Sep. 1978
W. B. Smith Feb. 1979 391 p refs Symp. held at Asheville, N. C., 15-17 May 1978
(Contract EPA-68-02-2131)
(PB-293363/8; EPA-600/7-79-065) Avail: NTIS HC A17/MF A01 CSCL 07D

The proceedings consist of 17 papers on improved instruments and techniques for sampling and measuring particulate emissions and aerosols; e.g., cascade impactors, cyclone collectors, and diffusion-battery/nuclei-counter combinations. Transmissometers and instruments for measuring scattered light were used for continuous monitoring of emissions from a secondary lead s melter and from three pulp and paper mill sources (a wood-waste-fired power boiler, a kraft recovery furnace, and a lime kiln). Also discussed were: computer-based data reduction for plotting curves of particle size distribution; equipment for generating aerosols and its use in calibrating instruments; analysis for trace elements in fly ash; and sources of sampling errors. GRA

46 GEOPHYSICS

Includes aeronomy; upper and lower atmosphere studies; ionospheric and magnetospheric physics; and geomagnetism.

For space radiation see *93 Space Radiation*.

N79-26582 Nebraska Univ. - Lincoln.
THE RELATIONSHIP OF THE THERMAL REGIME OF THE SOIL TO THE EXTRINSIC ENVIRONMENT, WITH SPECIAL REFERENCE TO THE NORTH CENTRAL UNITED STATES Ph.D. Thesis
Jack Timothy Dugan 1978 258 p
Avail: Univ. Microfilms Order No. 7910498

The relationship between soil temperatures and several extrinsic parameters, including: ambient temperature, precipitation, solar radiation, and altitude was clarified. Another aspect of the analysis was to develop models that can consistently estimate soil temperatures. Thirty-six points with five or more years of published data located in the north central United States were selected. Analyses were performed on four depths; 2, 4, 8, and 20 inches, to determine whether relationships with the external environment change with depth. The study was confined to a 40 week period, March 1 through December 5, eliminating 12 winter weeks when frozen soils and snow cover are present in the region. The principal analytical tool utilized was regression analysis. The results confirmed that a strong relationship exists between soil temperature and the extrinsic environment.
Dissert. Abstr.

N79-26583 California Univ., Los Angeles.
A STUDY OF CONDITIONAL INSTABILITY OF THE SECOND KIND AND A NUMERICAL SIMULATION OF THE INTERTROPICAL CONVERGENCE ZONE AND EASTERLY WAVES Ph.D. Thesis
Winston Cheng-Wen Chao 1979 276 p
Avail: Univ. Microfilms Order No. 7913713

The Arakawa-Schubert theory, which deals with the interaction of a cumulus ensemble with the large scale environment, was briefly reviewed. Subsequently, a method of applying this theory to a numerical model was presented. Arakawa-Schubert's theory was then applied to a linear study of conditional instability of the second kind (CISK) by an eigenvalue approach. The CISK mechanism was further studied using an initial value approach. The location, size, and number of disturbances were highly sensitive to the initial conditions. A review was also presented of the observational and theoretical aspects of the intertropical convergence zone and of easterly waves.
Dissert. Abstr.

N79-26584 Utah Univ., Salt Lake City.
AN INVESTIGATION OF THE INTERACTION, EVOLUTION AND MAINTENANCE OF THE LARGE-SCALE WAVES IN THE STRATOSPHERE AND TROPOSPHERE Ph.D. Thesis
James Larrien Hatch 1979 237 p
Avail: Univ. Microfilms Order No. 7911965

Based on National Meteorological Center and Air Force gridded analysis data over the Northern Hemisphere and tropical regions, an analysis of the interaction, evolution, and maintenance of available potential and kinetic energy was carried out. This analysis indicated that the maintenance of the energetics in the winter, middle latitudes followed a definite cycle. Analysis of energy transfer at boundaries indicated that boundary terms act principally to decrease centers of high kinetic and available potential energy or to increase energy in areas of relative minimum kinetic or available potential energy. An analysis of the mechanism for the evolution of the large scale atmospheric waves in the mid-latitudes, winter 1975-76, indicates that vertical convergence of geopotential flux provides a substantial mechanism for kinetic energy evolution in both the mid-latitude troposphere and stratosphere. Dissert. Abstr.

N79-26585 Stanford Univ., Calif.
DETERMINATION OF THE SEISMIC DESIGN PARAMETERS: A STOCHASTIC APPROACH Ph.D. Thesis
Jean Bernard Urbain Savy 1979 223 p
Avail: Univ. Microfilms Order No. 7912407

A model of release of the seismic energy in an earthquake is developed by assuming that a seismic event is created by the progressive rupture of small coherent patches over the entire rupture surface. The motion at the site created by the rupture of a patch is analytically found by using a dislocation model where the fault plane is assumed to be a geometrical discontinuity across which there exists a sudden discontinuity in the displace-

ment vector. The characteristics of the dislocation are represented by a ramp function. The solution is limited in the present case to body S-waves generated by the small patch sources.
Dissert. Abstr.

N79-26586*# Ohio State Univ. Research Foundation, Columbus. Dept. of Physics.
INVESTIGATION OF INFRARED SPECTRA OF ATMOSPHERIC GASES TO SUPPORT STRATOSPHERIC SPECTROSCOPIC INVESTIGATIONS Semiannual Report, 1 Nov. 1978 - 30 Apr. 1979
John H. Shaw Jun. 1979 128 p refs
(Grant NsG-7479; RF Proj. 761420/711626)
(NASA-CR-158716) Avail: NTIS HC A07/MF A01 CSCL 04A

Four papers are presented which discuss the following: information measures in nonlinear experimental design; information in spectra of collision broadened absorption lines; band analysis by spectral curve fitting; and least squares analysis of Voight shaped lines. Abstracts of five research papers on which the author collaborated and which were delivered at the 34th Symposium of Molecular Spectroscopy (Ohio State University, June 1979) are included along with a subroutine for use with BMDP3R to retrieve the parameters of 10 Voight shaped lines.
A.R.H.

N79-26587*# Illinois Univ., Urbana. Aeronomy Lab.
ROCKET RADIO MEASUREMENT OF ELECTRON DENSITY IN THE NIGHTTIME IONOSPHERE
B. E. Gilchrist and L. G. Smith 1 Apr. 1979 132 p refs
(Grant NGR-14-005-181)
(NASA-CR-157442; ISSN-0568-0581; UILU-ENG-79-2504; Aeronomy-85) Avail: NTIS HC A07/MF A01 CSCL 04B

One experimental technique based on the Faraday rotation effect of radio waves is presented for measuring electron density in the nighttime ionosphere at midlatitudes. High frequency linearly-polarized radio signals were transmitted to a linearly-polarized receiving system located in a spinning rocket moving through the ionosphere. Faraday rotation was observed in the reference plane of the rocket as a change in frequency of the detected receiver output. The frequency change was measured and the information was used to obtain electron density data. System performance was evaluated and some sources of error were identified. The data obtained was useful in calibrating a Langmuir probe experiment for electron density values of 100/cu cm and greater. Data from two rocket flights are presented to illustrate the experiment.
G.Y.

N79-26588# Illinois Univ., Urbana. Aeronomy Lab.
DAY-TO-DAY VARIATIONS OR ATMOSPHERIC TIDES AS OBSERVED BY METEOR RADAR
P. K. Enge and S. K. Avery 1 May 1979 85 p refs
(Grant NSF ATM-76-01773)
(UILU-ENG-79-2506; Aeronomy-87; ISSN-0568-0581) Avail: NTIS HC A05/MF A01

The day-to-day variability of the atmospheric tides at meteor heights is studied. The publications of the Garchy, France and Urbana, Illinois meteor groups are summarized. The Urbana system is described and an echo height accuracy is estimated for it. Algorithms for the analysis of a tide's vertical structure and variability are presented. The algorithms are applied to nineteen 24-hour sets and the results are discussed.
G.Y.

N79-26589# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
EFFECT OF WATER CONTENT ON THE COMPRESSIBILITY OF SNOW-WATER MIXTURES
Gunars Abele and F. Donald Haynes Jan. 1979 33 p refs
(AD-A066936; CRREL-79-2) Avail: NTIS HC A03/MF A01 CSCL 08/12

The stress-density relationships of snow-water mixtures were investigated and are shown as functions of water content, initial snow density, initial snow-water mixture density and rate of deformation. An increase in water content in snow at a particular density or a decrease in the rate of deformation (or strain rate) decreases the stress, but apparently not the specific energy required to reach a specific mixture density.
Author (GRA)

N79-26590# Innsbruck Univ. (Austria). Inst. of Experimental Physics.
STUDY OF WATER DRAINAGE FROM COLUMNS OF SNOW
A. Denoth, W. Seidenbusch, M. Blumthaler, P. Kirchlechner, W. Ambach, and S. C. Colbeck (CRREL) Hanover, N. H. CRREL Jan. 1979 20 p refs
(Grant DA-ERO-76-G-038; DA Proj. 4A1-61102-AT-24)
(AD-A066935; CRREL-79-1) Avail: NTIS HC A02/MF A01 CSCL 04/2

Experiments were conducted to study the flow of water through columns of homogeneous, repacked snow. The gravity flow theory of water flow through snow was verified, although possibly there is some dependence of the relative permeability on the state of metamorphism of the snow. Also, at very large values of saturation there may be some additional flow in saturated channels.
Author (GRA)

N79-26591# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
ACOUSTIC-TO-SEISMIC COUPLING PROPERTIES AND APPLICATIONS TO SEISMIC SENSORS Final Report, Jul. 1976 - Feb. 1978
Mark D. Flohr and Daniel H. Cress Feb. 1979 151 p refs
(AD-A067348; WES-TR-EL-79-1) Avail: NTIS HC A08/MF A01 CSCL 17/1

Acoustic-to-seismic coupling is investigated using measurements of acoustic and seismic signals generated from acoustic sources. Source types used for the measurements were: pure tones, band limited pink and white noise, and broad band noise from an acoustic impulse (gun shot). The measurements showed that the frequency dependence of acoustic-to-seismic coupling was independent of source type. However, the efficiency of coupling favored certain frequency bands for a fixed source height. Dependence of the coupling on source height was also investigated. Measurements showed that the favored frequency bands were lowered as the source height was increased for frequencies below 250 Hz. Two techniques were evaluated for separating the acoustic-to-seismic coupled signature from the measured seismic signature in order to support development of methods for suppressing acoustic-to-seismic coupled background noise. Alternatively, such separation could help improve target classification. The two techniques (one using velocity measurements, the other using coherent measurements) were shown to be potentially useful for separating the acoustic-to-seismic coupled part of the seismic signature from the measured seis nic signature. A theoretical approach with a simplified model of plane waves, a smooth surface, and no soil layering was not adequate to explain the measured dependence of acoustic-to-seismic coupling on frequency and source height.
Author (GRA)

N79-26592# SRI International Corp., Menlo Park, Calif. Molecular Physics Lab.
PHOTODISSOCIATION CROSS SECTIONS AND SPECTROSCOPY OF ATMOSPHERIC POSITIVE IONS Final Report, 16 Feb. 1976 - 15 Feb. 1979
G. P. Smith, L. C. Lee, P. C. Cosby, J. R. Peterson, and J. T. Moseley 13 Mar. 1979 62 p refs
(Contract DAAG29-76-C-0020; SRI Proj. PYU-4909)
(AD-A067186; SRI-MP-79-16; ARO-13635.5-PX) Avail: NTIS HC A04/MF A01 CSCL 04/1

Photodissociation cross sections have been measured for the atmospheric positive ions 04(+), NONO(+), N4(+), CO2CO2(+), CO4(+), 02(+)-H20, and 02(+)-2H2O at wavelengths between 3500 and 8400 A using a drift tube mass spectrometer coupled with an argon or krypton ion laser or a tunable dye laser. Upper limits were set for the ions COCO(+), NO(+)-CO2, NO(+)-N2, NO(+)-nH2O, and H3O(+)-nH2O. Solar photoloss rates for these ions were calculated.
Author (GRA)

N79-26593# Harvard Coll. Observatory, Cambridge, Mass.
AE REACTION RATE DATA Final Report, 1 Jul. - 31 Dec. 1978
A. Dalgarno 27 Mar. 1979 29 p refs Sponsored in part by DNA
(Contract F19628-78-C-0182)
(AD-A067941; AFGL-TR-79-0067) Avail: NTIS HC A03/MF A01 CSCL 04/1

The Atmosphere Explorer satellites carried a complement of instruments to measure simultaneously the ion and neutral composition of the atmosphere, the electron and neutral particle temperatures, various airglow emissions and the solar ionizing flux (Dalgarno et al. 1973). Detailed theoretical analyses have been performed from which empirical values of the rate coefficients of atmospheric ion-molecule reactions have been derived. The AE results have been reviewed recently (Torr and Torr 1978, Swider 1978). Laboratory studies have continued and they have also been reviewed recently (Albritton 1978, Ferguson et al. 1979). Author (GRA)

N79-26594# Massachusetts Inst. of Tech., Cambridge. Aerophysics Lab.
SOME EFFECTS OF VEHICLE FLOW FIELD ON THE CAPTURE EFFICIENCY OF A GERDIEN CAPACITOR ATMOSPHERIC PROBE Final Report, 1 Oct. 1977 - 30 Sep. 1978
Charles W. Haldeman, Robert H. Bush, and Scott W. Prey Hanscom AFB, Mass. AFGL Dec. 1978 41 p refs
(Contract F19628-76-C-0185; AF Proj. 8605)
(AD-A067710; MIT-TR-204; AFGL-TR-79-0009) Avail: NTIS HC A03/MF A01 CSCL 04/1

Wind tunnel tests of a rocket borne upper atmospheric probe for measuring atmospheric charge density are reported. The Gerdien capacitor probe consists of a short section of a co-axial capacitor. This is mounted on pylons from a model of the Tomahawk vehicle. Results are reported for the mach number range 2 to 3 and altitude range 26 to 50 km. Over this range the ratio of mass flow through the probe to mass flow in an equal cross section of the free stream ranged from .69 to .80. Schlieren photographs of the flow are presented. Author (GRA)

N79-26595# Alaska Univ., Fairbanks. Geophysical Inst.
INVESTIGATION OF THE PHENOMENOLOGY OF THE ARCTIC IONOSPHERE AND ITS RELATION TO THE PHENOMENOLOGY OF ARCTIC PARTICLE PRECIPITATION, PART 1 Final Report, 2 Oct. 1975 - 30 Sep. 1978
S. I. Akasofu Hanscom AFB, Mass. AFGL Sep. 1978 61 p refs
(Contract F19628-76-C-0074; AF Proj. 7663)
(AD-A067711; AFGL-TR-78-0269-Pt-1) Avail: NTIS HC A04/MF A01 CSCL 04/1

We have established the possibility of predicting the occurrence and intensity of magnetospheric substorms and also suggested a way of monitoring substorm activity on a real time basis. Author (GRA)

N79-26596# Naval Research Lab., Washington, D. C.
DESTRUCTION OF CYCLOTRON RESONANCES IN WEAKLY COLLISIONAL, INHOMOGENEOUS PLASMAS
J. D. Huba and S. L. Ossakow 10 Apr. 1979 28 p refs
(AD-A067827; NRL-MR-3916) Avail: NTIS HC A03/MF A01 CSCL 04/1

It is shown, both analytically and numerically, that cyclotron resonances can be destroyed in dense (omega sub rho = Omega, where omega sub rho is the plasma frequency and Omega is the cyclotron frequency), weakly collisional, inhomogeneous plasmas when (nu/Omega) k-squared (r sub L) squared somewhat = 1, where nu is the collision frequency and r sub L is the mean Larmor radius. The theory is based upon a model Fokker-Planck equation. It is found that the particles make a transition from magnetized to unmagnetized behavior. This is an important result since it indicates that the ion- and electron-cyclotron-drift instabilities transform into their unmagnetized counterparts, the lower-hybrid-drift instability and the ion acoustic instability, respectively. The ion-cyclotron-drift instability (or drift-cyclotron instability) is examined in detail and is found to become the lower-hybrid-drift-instability in the region of maximum growth when (sq.rt.m sub e/m sub i) omega/Omega sub i somewhat = nu sub ii/Omega sub i somewhat = m sub e/m sub i for T sub e approximately equal T sub i plasmas. The first inequality is required to overcome electron viscous damping, while the second allows the ions to become unmagnetized. Applications to the equatorial F region of the ionosphere and the Tandem Mirror Experiment (TMX) are discussed. Author (GRA)

N79-26597# Air Force Geophysics Lab., Hanscom AFB, Mass.
MODELING OF THE GEOSYNCHRONOUS ORBIT PLASMA ENVIRONMENT. PART 3: ATS-5 AND ATS-6 PICTORIAL DATA ATLAS
Henry B. Garrett, R. E. McInerney, S. E. DeForest, and B. Johnson 15 Jan. 1979 263 p refs
(AD-A067843; AFGL-TR-79-0015-Pt-3; AFGL-ERP-653) Avail: NTIS HC A12/MF A01 CSCL 04/1

Data on the geosynchronous plasma environment derived from the UCSD plasma detectors on the ATS-5 and ATS-6 satellites have been carefully compiled into a pictorial atlas. The atlas consists of 12 days of data from 1969 (ATS-5), 38 days from 1970 (ATS-5), 37 days from 1974 (ATS-6), and 8 days from 1976 (ATS-6). The data are 10-min averages of the first four moments of the plasma distribution function for the electrons and ions. The data are presented in the form of spectrograms and line plots along with detailed ephemeris and geophysical information. Two computer tapes are available, the formats of which are given in an appendix. Author (GRA)

N79-26598# Naval Research Lab., Washington, D. C.
PLASMA INSTABILITIES IN THE EQUATORIAL F-REGION: NATURAL AND ARTIFICIAL MECHANISMS Interim Report
Edward P. Szuszczewicz, Sidney L. Ossakow, Gary W. Sjolander, Julian C. Holmes, and David N. Walker 17 Apr. 1979 28 p refs
(AD-A068040; NRL-MR-3940) Avail: NTIS HC A03/MF A01 CSCL 04/1

Accumulating information regarding the equatorial F-region ionosphere has proven it to be a particularly important domain for the communications and ionospheric sciences as well as investigation of fundamental plasma processes that have counterparts in atmospheric releases and controlled laboratory experiments. This wide range of interest has in recent years brought considerable intensity into equatorial investigations with major technical, scientific, and engineering advances contributing to our current understanding and future plans for adaptive communication system design and ionospheric modification and control. Rapid advances require occasional synthesis in order to draw proper perspectives and establish an improved definition of near-term and longer range plans. This document bears that objective, particularly as it relates to radar, rocket, and satellite studies of the turbulent ionospheric plasma state, the theoretical and computational descriptions, and chemical releases for controlled ionospheric modifications. Emphasis is placed on important relationships involving spread F, naturally-occurring ionospheric bite-outs, and artificial ionospheric holes. Current understanding is reviewed, deficiencies identified, and future programs involving the Naval Research Laboratory are discussed. GRA

N79-26599# Uppsala Ionospheric Observatory (Sweden).
USE OF A SINGLE FUNCTION SUBROUTINE FOR MULTI-REGION IONOSPHERIC PROFILES WITH A VERSATILE THREE-DIMENSIONAL RAY TRACING PROGRAM
G. O. Ajayi (Univ. of Ife, Nigeria) 1978 46 p refs Sponsored by Swed. Intern. Develop. Agency
(UIO-SR-78-03) Avail: NTIS HC A03/MF A01

A subroutine (TABLEX) which defines a concentric electron density ionospheric model from electron density data as a function of height is usually used with the three-dimensional ray tracing program when practical electron density profiles are employed. TABLEX makes use of a combination of quadratic and cubic interpolations. The computing time may be large when a ray must be traced over a long and complicated trajectory. A subroutine (MULREG) is described which can be used to represent experimental electron density profiles for use with the three-dimensional ray tracing program. Both storage requirements and computing time are reduced. MULREG is flexible and can be easily modified for new electron density profiles. MULREG has been applied in the investigation of the effect of electron density profile on the residual range error in the satellite based dual frequency positioning system. Author (ESA)

N79-26600# Uppsala Ionospheric Observatory (Sweden).
SOME SIGNIFICANT IONOSPHERIC DISTURBANCE EVENTS DURING SEPTEMBER 1977

Harald Derblom May 1978 9 p Submitted for publication
(UIO-SR-78-05) Avail: NTIS HC A02/MF A01

An increase in absorption in the HF range by a factor of two was observed to begin September 3 and lasting to September 26. Between September 13 and 26 the absorption remained at the high day level even during the night. The foF2 values showed a sudden drop when a disturbance started, followed by a gradual recovery over several days. This pattern was repeated several times. The F2-layer is apparently in a continuous initial stage of recovery, but never reaches equilibrium. The plasma frequency and virtual height of the F2-layer are closely coupled. Whenever foF2 decreases the h F2 increases. This is due to a major redistribution of plasma during an ionospheric storm. Four significant absorption events are analyzed separately. The first day event, September 19, can be linked to a known flare. The second day event, September 21, has a similar pattern but no appropriate flare is reported. The third and fourth events, September 21 and 22, respectively, seem to be due to high energetic particle precipitation. Author (ESA)

N79-26601# Danish Meteorological Inst., Copenhagen.
THULE GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1971
1978 53 p refs
(ISBN-87-7478-131-6) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Thule magnetic laboratory during 1971 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26602# Danish Meteorological Inst., Copenhagen.
THULE GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1972
1977 53 p refs
(ISBN-87-7478-132-4) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Thule magnetic laboratory during 1972 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26603# Danish Meteorological Inst., Copenhagen.
THULE GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1973
1977 52 p refs
(ISBN-87-7478-133-2) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Thule magnetic laboratory during 1973 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26604# Danish Meteorological Inst., Copenhagen.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1971
1978 55 p refs
(ISBN-87-7478-128-6) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Godhavn magnetic laboratory during 1971 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26605# Danish Meteorological Inst., Copenhagen.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1972
1977 58 p refs
(ISBN-87-7478-129-4) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Godhavn magnetic laboratory during 1972 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26606# Danish Meteorological Inst., Copenhagen.
GODHAVN GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1973
1977 58 p refs
(ISBN-87-7478-130-8) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Godhavn magnetic laboratory during 1973 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26607# Danish Meteorological Inst., Copenhagen.
RUDE SKOV GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1975
1977 55 p refs
(ISBN-87-7478-149-9) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Rude Skov magnetic laboratory during 1975 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26608# Danish Meteorological Inst., Copenhagen.
RUDE SKOV GEOPHYSICAL OBSERVATORY: MAGNETIC RESULTS, 1976
1977 40 p refs
(ISBN-87-7478-150-2) Avail: NTIS HC A04/MF A01

The results of the standard observations carried out at the Rude Skov magnetic laboratory during 1976 are presented. The measurements show hourly means of horizontal and vertical intensity and hourly means of magnetic declination. Diurnal extreme values and mean diurnal inequalities are also given.
Author (ESA)

N79-26609# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
TROPOSPHERIC RADIATIVE DIVERGENCE DURING PHASE 3 OF THE GARP ATLANTIC TROPICAL EXPERIMENT (GATE)
Stephen K. Cox and Keith T. Griffith Jun. 1978 182 p refs Sponsored in part by NOAA
(Grants NSF ATM-77-15369; NSF OCD-74-21678)
(PB-292761/4; AS-PAPER-291; ISSN-0067-0340) Avail: NTIS HC A09/MF A01 CSCL 04A

The model divergence profiles were derived from several radiative transfer computational routines with adjustments to accommodate the observational data collected during the GATE experiment. The technique involves the compositing of twenty-eight shortwave and twenty-five longwave vertical divergence profiles based on SMS-1 satellite data and synoptic data. Tables of the longwave, shortwave and total radiative divergence profiles and the cloud top pressure distribution are given for a variety of space and time scales. The magnitudes of the diurnal variability of the horizontal gradients in the radiative divergence fields appear adequate to explain at least some of the diurnal variations in cloud cover and precipitation. GRA

N79-26610# Kansas State Geological Survey, Lawrence.
A SUMMARY OF THE REGIONAL TECTONICS AND SEISMICITY OF EASTERN KANSAS; SUMMARY OF PROJECT ACTIVITIES AND RESULTS TO THE END OF THE SECOND YEAR, OR SEPTEMBER 10, 1979 Progress Report, Oct. 1976 - Oct. 1978
Frank W. Wilson Mar. 1979 87 p refs
(Contract NRC-04-77-017)
(PB-293661/5; NUREG-CR-0666) Avail: NTIS HC A05/MF A01 CSCL 18I

The Kansas Geological Survey, in cooperation with the State Geological Surveys of Oklahoma, Nebraska, and Iowa, is making a five-year study of the regional tectonics and seismicity of the Nemaha Uplift, an area of moderate historical seismicity, and related geologic structures in order to better understand the sources and mechanisms of the seismic activity in the central

midcontinent. The studies are intended to provide a more rational evaluation of earthquake risk as it applies to the design of nuclear facilities. The progress of all research done in Kansas during the first two years of the project is summarized and the results and preliminary conclusions are detailed. GRA

N79-26611# Environmental Sciences Research Lab., Research Triangle Park, N.C.
ASSOCIATION BETWEEN METEOROLOGICAL CONDITIONS AND HIGH OZONE AND SULFATE CONCENTRATIONS: A 1974 EPISODE IN THE EASTERN UNITED STATES Progress Report, Feb. - Oct. 1978
Gerard A. DeMarrais Feb. 1979 75 p refs
(PB-293485/9; EPA-600/4-79-009) Avail: NTIS HC A04/MF A01 CSCL 04A

Slow moving and subsiding air was found to contribute to the high concentrations of both pollutants. Long range transport, as shown by trajectory analyses, was a factor in the problems in most areas, but the worst situations with regard to sulfates were associated with emissions from nearby, upwind sources. While high ozone concentrations were observed immediately prior to high sulfate concentrations in many areas, there were high sulfate concentrations that were not associated with high ozone concentrations. In the latter situation, the high sulfate concentrations were associated with air which had earlier movement over areas with high SO2 emission. GRA

N79-26612# Geological Survey, Menlo Park, Calif. Seismic Engineering Branch.
ON THE DEVELOPMENT OF STRONG-MOTION INSTRUMENT NETWORKS IN THE UNITED STATES Progress Report
R. B. Matthiesen Oct. 1978 97 p refs
(Contract NSF CA-114)
(PB-293579/9; Open-File-78/1024; NSF/RA-780462) Avail: NTIS HC A05/MF A01 CSCL 08K

A plan for the distribution of strong-motion instrumentation throughout the United States is outlined. Concepts and strategies for planning and directing the development of the program include specific ground-motion and structural response studies. Certain regions in the United States are evaluated, in terms of activities and possibilities, in greater detail than in preliminary studies. Priorities and implications involved in the implementation of the program are presented. GRA

N79-26613# Systems Applications, Inc., San Rafael, Calif.
THE DEVELOPMENT OF MATHEMATICAL MODELS FOR THE PREDICTION OF ANTHROPOGENIC VISIBILITY IMPAIRMENT, VOLUME 1 Final Report, Oct. 1977 - Sep. 1978
Douglas A. Latimer, Robert W. Bergstrom, Stanley R. Hayes, Mei-Kao Liu, John H. Seinfeld, Gary Z. Whitten, Michael A. Wojcik, and Martin J. Hillyer Sep. 1978 210 p refs 3 Vol.
(Contracts EPA-68-01-3947; EPA-68-02-2593)
(PB-293119/4; EF78-68A-Vol-1; EPA-450/3-78-110A-Vol-1)
Avail: NTIS HC A10/MF A01; also available in set of 3 reports HC E13 as PB-293118-SET CSCL 04A

A study to recommend and develop models that predict the contribution of man made air pollution to visibility impairment in Federal Class 1 areas is presented. Two models were developed. A near source plume model based on a Gaussian formulation was designed to compute the impact of a plume on visual range and atmospheric coloration. A regional model was designed to calculate pollutant concentrations and visibility impairment resulting from emissions from multiple sources within a region with a spatial scale of 1000 km and a temporal scale of several days. Models were developed which are useful predictive tools for making policy and regulatory decisions, for evaluating the impacts of proposed new sources, and for determining the amount of emissions reduction required from existing sources. GRA

N79-26614# Systems Applications, Inc., San Rafael, Calif.
THE DEVELOPMENT OF MATHEMATICAL MODELS FOR THE PREDICTION OF ANTHROPOGENIC VISIBILITY IMPAIRMENT. VOLUME 2: APPENDICES Final Report, Oct. 1977 - Sep. 1978
Douglas A. Latimer, Robert W. Bergstrom, Stanley R. Hayes, Mei-Kao Liu, John H. Seinfeld, Gary Z. Whitten, Michael A. Wojcik, and Martin J. Hillyer Sep. 1978 519 p 3 Vol.
(Contracts EPA-68-01-3947; EPA-68-02-2593)
(PB-293120/2; EF78-68B-Vol-2; EPA-450/3-78-110B-Vol-2)
Avail: NTIS HC A22/MF A01, also available in set of 3 reports HC E13 as PB-293-118-SET CSCL 04A

Models that predict the contribution of man-made air pollution to visibility impairment in Federal Class 1 areas are presented. The topics are the following: analysis of visual range in the Northern Great Plains and the Southwest; atmospheric optics calculation; the chemistry of sulfate formation; description of the plume visibility model; plume model sample output; description of the Northern Great Plains regional model; and application of the regional model to the prediction of visibility impairment in the Northern Great Plains. GRA

N79-26615# Systems Applications, Inc., San Rafael, Calif.
THE DEVELOPMENT OF MATHEMATICAL MODELS FOR THE PREDICTION OF ANTHROPOGENIC VISIBILITY IMPAIRMENT, VOLUME 3: CASE STUDIES FOR SELECTED SCENARIOS Final Report, Oct. 1977 - Sep. 1978
Douglas A. Latimer, Robert W. Bergstrom, Stanley R. Hayes, Mei-Kao Liu, John H. Seinfeld, Gary Z. Whitten, Michael A. Wojcik, and Martin J. Hillyer Sep. 1978 98 p 3 Vol.
(Contracts EPA-68-01-3947; EPA-68-02-2593)
(PB-293121/0; EF78-68C-Vol-3; EPA-450/3-78-110C-Vol-3)
Avail: NTIS HC A05/MF A01; also available in set of 3 reports HC E13 as PB-293118-SET CSCL 04A

The contribution of man-made air pollution to visibility impairment in Federal Class 1 areas was studied. Case studies of power plant plume visual impact for a variety of emission, meteorological, and ambient background scenarios are discussed. GRA

N79-27067# Joint Publications Research Service, Arlington, Va.
RELIEF OF THE OCEAN FLOOR AND THE NEW GLOBAL TECTONICS
A. V. Ilin *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 72 (JPRS-73663) 12 Jun. 1979 p 61-74 refs Transl. into ENGLISH from Priroda (Moscow), no. 3, Mar. 1979 p 93-102 (For primary document see N79-27064 17-99)
Copyright. Avail: NTIS HC A05/MF A01

47 METEOROLOGY AND CLIMATOLOGY

Includes weather forecasting and modification.

N79-26616 Miami Univ., Coral Gables, Fla.
LAKE-EFFECT STORMS OF LAKE ONTARIO Ph.D. Thesis
James Matthew Gross 1978 211 p
Avail: Univ. Microfilms Order No. 7911791

Lake-effect storms are vigorous convective storms which occur in late fall and early winter to the lee of the Great Lakes. These storms are characterized by their local, often very heavy snowfalls. Lake-effect storms of Lake Ontario from both an observational and theoretical point of view are examined. The observational study was limited to two lake-effect storms for Lake Ontario. The observed three-dimensional structure of temperature and wind, and the precipitation pattern of these disturbances is given. Each storm had four stages of development. The theoretical study centered on the development of a mesoscale model to simulate lake-effect storms. A three-dimensional model based on the time dependent, nonlinear primitive equations was constructed for the atmosphere of the Lake Ontario basin. The model is hydrostatic. A series of sensitivity studies were conducted to determine the relative importance of various physical processes which contribute to the development of lake-effect storms.
Dissert. Abstr.

N79-26617 State Univ. of New York at Albany.
CHAFF SEEDING IN A DYNAMICAL-ELECTRICAL CLOUD MODEL Ph.D. Thesis
John Herbard Helsdon, Jr. 1979 135 p
Avail: Univ. Microfilms Order No. 7913229

A two-dimensional, slab-symmetric, time-dependent cloud model was devised to simulate deep convection in the atmosphere. The dynamics and thermodynamics of deep convection are prescribed and the microphysics of the liquid phase is parameterized. Within this framework the electrical nature of the atmosphere was added. Small positive and negative ions as well as the charge associated with rain and cloud particles are included. The electrical properties are allowed full interaction with the hydrodynamic properties of the model. Charge is transported by conduction, convection and turbulent diffusion and free ions interact with hydrometers through conduction, diffusion and evaporation. A separation probability is specified for cloud and raindrops colliding in the electric field allowing for charge transfer by the polarization mechanism. The formulation for the simulation of the chaff seeding process was developed. Dissert. Abstr.

N79-26618 Colorado State Univ., Fort Collins.
WIND CHARACTERISTICS OVER RIDGES Ph.D. Thesis
Reinier Jacobus Bernardus Bouwmeester 1978 249 p
Avail: Univ. Microfilms Order No. 7913805

Prediction techniques of wind velocities over ridges were described as the physical processes that govern wind characteristics over ridges. A wind-tunnel study was presented of the flow field over triangular shaped and sinusoidal-shaped ridge models with varying upwind and downwind slopes under various thermal stratification conditions. A technique was developed to predict the velocity amplification profile above a ridge crest for arbitrary ridge shape. Larges speedups were measured for the steepest symmetrical ridge which did not cause flow separation. Criteria for flow separation over ridges were established. Effects of turbulence, surface roughness, and thermal stratification on speedup were of secondary importance. These effects together with the slopes of the ridge are significant in determining whether or not separation occurs. Applicability of the results for ridges with finite width is discussed. Dissert. Abstr.

N79-26619 Direction de la Meteorologie Nationale, Paris (France). Div. Climatologie du Service Meteorologique Metropolitan.
PROCESSING METHODOLOGY FOR DAILY PLUVIOMETRIC DATA [METHODES DE CRITIQUE DES DONNEES PLUVIOMETRIQUES QUOTIDIENNES]
Raymond Trendel, Bruno Rambaldelli, and Bernard leCavil Jun. 1978 85 p refs In FRENCH
(MN-MONO-102) Avail: Issuing Activity

A data control procedure and a 'missing data' computing procedure were developed from a theoretical rain method. Monthly precipitation and specific rain events are decomposed into a theoretical rain which is representative of the station and a homogeneity index related to the perturbations intensity. The use of the method is illustrated with pluviometric data from the region of Gad (France). Author (ESA)

N79-26620 Direction de la Meteorologie Nationale, Paris (France).
INSOLATION DURATION, INSOLATION QUOTIENT IN FRANCE: 1951 - 1970 [DUREE ET FRACTION D'INSOLATION EN FRANCE: PERIODE 1951 - 1970 AVEC LONGUES SERIES DE MESURES]
M. Garnier Jul. 1978 80 p refs In FRENCH
(MN-MONO-105) Avail: Issuing Activity

Average insolation periods were computed for more than 100 stations from 1951 to 1970. This data was used to update and improve yearly and monthly weather maps. Insolation ratios (measured insolation divided by maximum insolation) were computed and are displayed on these maps. Author (ESA)

N79-26621 Direction de la Meteorologie Nationale, Paris (France).
CLIMATOLOGY IN FRENCH POLYNESIA [LE CLIMAT DE LA POLYNESIE FRANCAISE]
A. dHauteserre Jun. 1978 71 p In FRENCH
(MN-MONO-107) Avail: Issuing Activity

Monthly and yearly climatic data averages and extremes are given for 24 meteorological stations in 5 French Polynesian archipelagos. The tabulated variables are temperature, humidity, rain, surface wind, evaporation, insolation, and cloud cover. A description of the localities and comments on climate are given. The data is related to ocean resources exploitation and solar energy development. Author (ESA)

N79-26622 Direction de la Meteorologie Nationale, Paris (France).
FOEHN IN HAUTE TARENTAISE: A CONTRIBUTION TO THE STUDY OF A FRENCH ALPINE FOEHN [LE FOEHN EN HAUTE TARENTAISE: CONTRIBUTION A L'ETUDE D'UN FOEHN ALPIN FRANCAIS]
C. Buchot Jul. 1978 74 p refs In FRENCH
(MN-MONO-108) Avail: Issuing Activity

General foehn criteria are given for foehn cases in Alpine valleys. Available parameters measured over a 15 year period at Bourg Saint Maurice are listed in detail. Altitudes and watershed conditions are described briefly. Comparison with synchronous and homothetic data in a Swiss valley shows a common foehn origin for the entire Alps region. Author (ESA)

N79-26623# Schweizerische Meteorologische Zentralanstalt, Zurich.
PROCEEDINGS OF THE FIFTEENTH INTERNATIONAL MEETING ON ALPINE METEOROLOGY, VOLUME 1
1978 333 p refs In ENGLISH, GERMAN, ITALIAN and FRENCH
Meeting held at Grindelwald, Switz., 19-23 Sep. 1978
(SZ-ISSN-0080-7346; Rept-40) Avail: NTIS HC A15/MF A01

Studies of the meteorological phenomena in the Alpine regions of Europe are reported. For individual titles, see N79-26624 through N79-26710.

N79-26624# Meteorologisches Observatorium, Hohenpeissenberg (West Germany).
QUANTITATIVE PRECIPITATION MEASUREMENTS BY RADAR IN THE AMMER MOUNTAINS [QUANTITATIVE RADAR-NIEDERSCHLAGSMESSUNGEN IM AMMERGEBIRGE]
Johann Riedl and Rudolf Aniol *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 9-11 In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

First results of quantitative precipitation measurements by radar with partially screened radarbeam in mountainous region are reported. Problems of those measurements are shown by aid of an example. Author

N79-26625# Ecole Polytechnique Federale de Lausanne (Switzerland).
REMOTE MEASUREMENT OF THE ATMOSPHERIC PARAMETERS, USING A RADIOACOUSTIC SOUNDER [MESURE A DISTANCE DES PARAMETRES DE L'ATMOSPHERE AU MOYEN D'UN SONDEUR RADIOACOUSTIQUE]
Pierre E. Ravussin *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 12-15 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The new requirements for air quality have led the working group EPFL-ISM and the Institute of Mechanics of Turbulence of the Swiss Federal Institute of Technology of Lausanne to develop an automatic radioacoustic sounding system of the main atmospherical parameters: wind, temperature, humidity. Parts of the prototype have given measurements of the temperature profile of the atmosphere up to an altitude of 3000 m with an acoustic power of 50 W and of the vertical wind up to 450 m. At the same time a discriminating method gives the height of the inversion. Author

N79-26626# Schweizerische Meteorologische Zentralanstalt, Zurich.
MOUNTAINS AND ATMOSPHERIC BOUNDARY LAYERS [GEBIRGE UND GRENZSCHICHTEN IN DER ATMOSPHERE]
Marijan Cadez *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 16-18 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

In mountainous regions often cold and warm stemming zones are separated from the surrounding air with boundary layers. Some properties of such a layer are described. Author

N79-26627# Institute for Meteorology and Water Economy, Cracow (Poland).

THE CHANGES OF THE ATMOSPHERIC CIRCULATION INDICES OVER THE POLISH WEST CARPATHIANS DURING THE LAST 27 YEARS

Tadeusz Niedzwiedz *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 19-22 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

Monthly values are given of circulation indices of: progression - P, meridionality - M, southern circulation - S, and cyclonicity - C over the Polish West Carpathians. Great changeability of those indices is stated over 1951-1977. On the basis of data from the meteorological station at Nowy Sacz, influence of these indices was examined on the temperature and precipitation in January and July. F.O.S.

N79-26628# Schweizerische Meteorologische Zentralanstalt, Zurich.

SUBSIDENCE EFFECTS OF THE ALPS [ALPENBEDINGTE SUBSIDENZEFFEKTE]

Walter Zuellig and Urs Keller *In* Its Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 23-26 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

Even in disturbed situations it is quite common that weather is much better in the Alps than in other parts of Switzerland. An explanation is tried with 2 situations: The windy warm sector and cold subsident air masses near the Alps. Author

N79-26629# Deutscher Wetterdienst, Neustadt (West Germany).

INTENSITY OF THE LEE-CYCLOGENESIS OVER NORTHERN ITALY [ZUR INTENSITAT DER LEE-ZYKLOGENESE UEBER OBERITALIEN]

Manfred Kurz *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 27-30 In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

By means of two examples and with the aid of vorticity- and omega-equation, the different intensities of the lee-cyclogenesis over Northern Italy are discussed. F.O.S.

N79-26630# Zentralanstalt fuer Meteorologie und Geodynamik, Wien (Austria).

TIME-HEIGHT SECTIONS OF A FRONTAL SYSTEM OVER THE ALPS [ZEIT-HOEHENSCHNITTE EINES FRONTENSYSTEMS UEBER DEN ALPEN]

Gerd Ragette *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 31-34 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

Time-height sections of potential wet-bulb temperature, relative humidity and wind have been constructed to reveal the mesostructure of a frontal system which crossed the East Alps. The sign of the vertical motions is deduced in the vertical, and the regions of condensation and sublimation are outlined. Author

N79-26631# Innsbruck Univ. (Austria). Institut fuer Meteorologie und Geophysik der Universiraet.

SYNOPTIC ANALYSIS OF AN ALPINE WEATHER MAP [SYNOPTISCHET ERFAHRUNGEN MIT EINER ALPENWETTERKARTE]

Reinhold Steinacker *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 35-38 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

The comparatively dense network of synoptic stations in the alpine region allowes a detailed synoptic analysis on the map-scale 1:1,000,000. Regional and local orographic influences can be documented. Special features of Alpine weather map analyses are shown for some cases and possible improvements in short-range regional weather forecasts are indicated. Author

N79-26632# Geophysikalische Beratungstelle, Memmingen (West Germany).

VISUAL WEATHER CONDITIONS FOR FLIGHT OVER THE ALPS [SICHTFLUGWETTERBEDINGUNGEN FUER ALPENUEBERQUERUNGEN]

Oswald Gasser *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 39-42 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

By means of the daily available observations from 1/2/1975 - 31/1/1977 at Memmingen the visual conditions (VMC) for flight over the Alps in the area Zurich-Mailand-Venedig-Salzburg are presented. During cyclonic-weather-situations the VMC-Flight is fixed by the weather observations in higher levels of the Alps and in anticyclonic-situations, especially in winter-time, the observations in the foreland and in valleys are very important. The central area (Memmingen-Bozen) is favored in respect to flight weather, compared to the routes Zurich-Mailand and especially Salzburg-Venedig. Author

N79-26633# Deutscher Wetterdienst, Munich (West Germany).

THE GAFOR SYSTEM OF VISUAL FLIGHT FORECAST FOR ALPINE REGION [GAFOR-SICHTFLUGVORHERSAGEN IM ALPENRAUM]

Klaus-J. Tenter *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 43-46 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

After the description of the GAFOR-System, eight months of forecasts for the General Aviation are used to make a statement of Visual Flights in Switzerland and Austria. The monthly differences between valleys and pass-routes are shown. Author

N79-26634# Wien Univ. (Austria).

WEATHER-CAUSED AVIATION ACCIDENTS IN THE AUSTRIAN ALPS [WETTERBEEINFLUBTE FLUGUNFAELLE IN DEN OESTERREICHISCHEN ALPEN]

Alexander G. Keul *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 47-50 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

The rising accident rate in General Aviation over Austrian territory has stimulated a meteorological case study. For the interval 1966-1976, distribution and causal factors of weather-involved accidents are extracted. The hypothesis that variations of the regional VFR conditions are responsible for the accident distribution is tested for Wien - Salzburg and refuted. Author

N79-26635# Schweizerische Meteorologische Zentralanstalt, Zurich.

OBJECTIVE REGIONAL FORECAST FOR THE BERNESE ALPS [OBJEKTIVE REGIONALVORHERSAGE FUER DAS BERNER OBERLAND]

Hans W. Courvoisier *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1, 1978 p 51-48 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)

Avail: NTIS HC A15/MF A01

A method is discussed for regional forecasts on an objective statistical basis using Schuepp's classification of synoptic situations and the numerical prediction. The method is specially designed for application to forecasts two or three days ahead. A test on forecasts of this period shows that the rates of success obtained by the objective method are about 5% higher than those obtained by the conventional method. Author

N79-26636# Zentralanstalt fuer Meteorologie und Geodynamik, Wien (Austria).

A REPORT ON OBJECTIVE WEATHER FORECASTING METHODS OF THE CENTRAL INSTITUTE OF METEOROL-

OGY AND GEODYNAMICS, WITH SPECIAL CONSIDERATION OF THE MODEL OUTPUT STATISTICS (MOS) METHOD [BERICHT UEBER OBJEKTIVE PROGNOSENVERFAHREN AN DER ZENTRALANSTALT FUER METEOROLOGIE UND GEODYNAMIK UNTER BERUECKSICHTIGUNG VON MOS (MODEL OUTPUT STATISTICS)]

Alois Machalek *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 53-56 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Several objective weather forecasting methods are discussed. The MOS method (model output statistics) is shown to be the most important. Referring to this theme, studies are made at the Zentralanstalt fur Meteorologie und Geodynamik in Vienna and these research projects will be represented here. Author

N79-26637# Bayerisches Landesamt fuer Umweltschutz, Munich (West Germany).

AIR PURIFICATION IN THE ALPINE REGION [LUFTREINHALTUNG IM ALPENRAUM]

Hans Schwegler *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 57-59 ref In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Meteorology is one of the most important determinants in the area of air pollution; for that reason there are partly different conditions of emission of pollutants in the region of the Alps compared to those in the plane surface. Author

N79-26638# Ente Nazional per l'Energia Elettrica, Milan (Italy).

A MICROMETEOROLOGICAL NETWORK FOR STUDY OF TRANSPORT AND DIFFUSION OF POLLUTANTS IN TWO APENNINE VALLEYS [UNA RETE MICROMETEOROLOGICAL PER LO STUDIO DEL TRASPORTO E DELLA DIFFUSIONE DI INQUINANTI IN DUE VALLATE APPENNINICHE]

Marcello Pagliari *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meterol., Vol. 1 1978 p 60-63 In ITALIAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Geothermal steam always comes together with gases, such as radon and H2S, different in composition and quantity from well to well. In the Lardarello basin, the most ancient and developed Italian geothermal area, a meteorological network is now set up, in order to study diffusion and transport of incondensible gases. This network and correlations between different meteorological parameters and different sites are listed. Author

N79-26639# Wien Univ. (Austria). Institut fuer Meteorologie und Geophysik.

THEORY OF NOXIOUS GASES DIFFUSION AT LOW INVERSION [ZUR THEORIE DER AUSBREITUN VON SCHADGASEN BEI NIEDRIGEN INVERSIONEN]

Heinz Reuter *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 64-66 ref In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A theory is developed which leads to a reduction of the diffusion parameters, when mixing heights are included in dispersion calculations, and consequently to a narrowing of stack plumes. The degree is dependent on the height of the mixing layer. Author

N79-26640# Schweizerische Meteorologische Zentralanstalt, Zurich.

FORECAST OF AIR POLLUTION IN DEEP VALLEYS [VORHERSAGE DER LUFTVERUNREINIGUNG FUER TALBECKEN]

Janko Pristov (Meteoroloski zavod SR Slovenije, Ljubljana, Yugoslavia) *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 67-70 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Meteorological conditions in basins are strongly different from those in the open areas, particularly in the cold part of the year. In basins there is frequently a layer of cold air which provides high mean day concentrations of SO2 in spite of relatively weak pollution sources. Weather processes and meteorological elements are considered, on the basis of which the intensity of air pollution can be foretold. Two-years experimental predicting of air pollution in basins gave satisfactory results. Author

N79-26641# Zentralanstalt fuer Meteorologie und Geodynamik, Wien (Austria).

SO2 IMMISSION CONCENTRATION DURING CALM IN CENTRAL ALPINE BASINS (AICHFELD-MUR BASIN STYRIA) [SO2 IMMISSIONSKONZENTRATIONEN BEI CALMEN IN INNER ALPINEN BECKENLAGEN (AICHFELD-MURBODEN, STMK)]

Ulrike Pechinger *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 71-74 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

In view of the considerable difficulties arising in the theoretical treatment of dispersion during calm conditions, SO2-concentration registrations from three towns in an Alpine basin are used to derive an empirical factor for the prediction of SO2-emission during calm conditions. Author

N79-26642# Meteorologisches Observatorium, Hohenpeissenberg (West Germany).

DAILY VARIATION OF NCAR-SURFACE OZONE AT MOUNTAIN STATIONS [TAGESGANG DES BODENNANEN OZONS AN BERGSTATIONEN]

Reinhold Hartmannsgruber *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 71-74 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The different diurnal variation of ozone near the surface at two mountain stations (Hotten Peissenberg 1000 m and Wendelstein 1832 m) are discussed. Author

N79-26643# Zagreb Univ. (Yugoslavia). Faculty of Sciences.

THE OPTIMAL LINE FOR TURBULENT WIND OSCILLATIONS DETERMINED FROM ENERGY SPECTRA

Inga Lisac *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 77-79 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The variance spectra for wind components allow the determination of predominant direction for pronounced air flow turbulent oscillations. The direction can be determined under the assumption that an oscillation with a given time period can be treated as being approximately a periodic sinus function. The main steps in the mathematical procedure with the aid of which the direction can be determined are given. The procedure was applied to the spectral analysis results for surface wind in Zagreb. Author

N79-26644# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. for Atmospheric Physics.

LEE SIDE WIND PROFILES DURING FOEHN

Peter D. Phillips and Hans Richner *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 80-83 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The 82 pilot balloon and radiosonde ascents made in the Reuss Valley of Northern Switzerland during Foehn are divided into five groups and a preliminary analysis is made to see if any simple relationship exists between the height of the internal boundary surface and the wind velocity in the cold pool or in the lower region of the foehn. A persistent SSE jet seen on many ascents below the main foehn tongue is considered in relation to the topography of the region. Author

N79-26645# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.

MOUNTAIN WINDS IN THE PLAINS
E. Dreiseitl and R. Phelps *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 84-85 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The local wind systems (upvalley, downvalley) east of the Colorado Rocky Mountains were analyzed. (Denver, Greely, Fort Collins and Brush). Well pronounced diurnal direction changes and the possible impact on air pollution were discussed. Author

N79-26646# Schweizerische Meteorologische Zentralanstalt, Zurich.
STRONG WINDS AND WEATHER CONDITIONS IN DINARIC ALPS [STARKWINDE UND WETTERLAGEN IN DEN DINARISCHEN ALPEN]
Edita Loncar (Hydrometeorologisches Inst., Zagreb, Yugoslavia) *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol. Vol. 1 1978 p 86-88 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A climatological-synoptical investigation of cases with the highest wind velocity hourly means at Gospic (Yugoslavia) indicates that strong winds in this region blow during a meridional circulation. Simultaneously a local orography influence coincides with a large scale flow. Author

N79-26647# CEE Joint Research Center, Ispra (Italy). Meteorological Observatory.
SOLAR RADIATION AND VALLEY BREEZE IN THE SOUTHERN PARTS OF THE ALPS
Claudio Gandino *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 89-91 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The correlation between the duration of valley breeze and the daily solar radiation was computed for the Ispra Observatory and for the Lake Lugano buoy. Author

N79-26648# Schweizerische Meteorologische Zentralanstalt, Zurich.
ZONES OF CONVERGENCE IN LOCAL AIR FLOW IN VALLEYS AND BASINS
Zdrauko Petkovsek (Faculty of Sciences (FNT), Ljubljana, Yugoslavia) *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 92-96 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Due to night drainage winds in valleys and basins the local drainage of air occurs, forming zones of convergence. The position of these zones does not correspond, in general, to the axis of the valleys, therefore, a model is presented for the determination of zones of convergence, depending on some meteorological parameters, but mostly on relief characteristics of valleys and basins. Author

N79-26649# Schweizerische Meteorologische Zentralanstalt, Zurich.
LOCAL WINDS IN ZAGREB [DIE LOKALWINDE IN ZAGREB]
Drazen Poje (Hydrometeorologisches Inst., Zagreb, Yugoslavia) *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 97-99 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

On the base of the windrecordings, as well as of the measurements of the global radiation for the ten year period (1966-1975) at the observatory Zagreb - Grec, the occurence of the mountain and valley winds in Zagreb were analyzed. It could be shown that for the occurence of valley wind, the energy in the amount of 20 cal/sq cm per hour is necessary. If this condition is fulfilled, the pressure difference between Zagreb and Split of 1,5 mb should not be surpassed. J.A.M.

N79-26650# Schweizerische Meteorologische Zentralanstalt, Zurich.
BIOLOGICAL EFFECTS OF HIGH ALTITUDE CLIMATE AND ITS THERAPEUTIC APPLICATIONS
W. S. Tromp (Biometeorological Research Centre, Leiden, the Netherlands) *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 100-103 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A01

Important parameters of high altitude climate are described from the point of view of biological and medical research. Principal physiological effects of high altitude climate are also considered. Two groups of high altitude effects are discussed: the effects due to strong UV light and those due to reduced partial oxygen pressure. The therapeutic applications of high altitude climate (anemia, allergy, diabetes, eye diseases, gastric ulcer, heart diseases, mental diseases, respiratory diseases etc.) are reviewed. J.A.M.

N79-26651# Deutscher Wetterdienst, Freiburg (West Germany).
QUANTITATIVE EVALUATION OF THE COMPLEX THERMAL EFFECTS ON CLIMATIC THERAPY [DIE QUANTITATIVE ERFASSUNG DES THERMISCHEN WIRKUNGS KOMPLEXES IN DER KLIMATHERAPIE]
Gerd Jendrizky and Walter Soenning *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 104-107 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

By consideration of the short and longwave radiation, the comfort equation of Fanger (1970) was transferred to outdoor conditions (Klima-Michel-model). That allowed a quantitative analysis of a thermal environment and the determination of its stress, which was essential for the dosage in climatic-therapy and and for classification of climatic health-resorts. J.A.M.

N79-26652# Jagellonian Univ., Cracow (Poland).
CHARACTERIZING THERMAL CONDITIONS IN MOUNTAINOUS REGIONS FROM THE STANDPOINT OF REQUIREMENTS FOR CULTIVATED PLANT GROWTH [ZUR CHARAKTERISTIK DER THERMISCHEN VERHALTNISSE DEN BERGGEBIETEN VOM STANDPUNKT DER VEGETATIONSBEDURFNISSE DER KULTURPFLANZEN]
Mieczyslaw Hess, Tadeusz Niedzwiedz, and Barbara Brebska-Starkel *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1, 1978 p 108-112 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Use was made of the daily data concerning air temperatures recorded in the period from 1951 to 1970 by fifteen stations situated in the Lower Beskid range. The probability of the occurence of extreme air temperatures are discussed, and those values which set limits to the growing of agricultural plants were considered. J.A.M.

N79-26653# Schweizerische Meteorologische Zentralanstalt, Zurich.
MICROCLIMATIC CONDITIONS IN THE MOUNTAIN MIXED FOREST AT DIFFERENT CUTTING PROCEDURES [MIKOKLIMATISCHE VERHAELTNISSE IM BERGMISCHWALD BEI VERSCHIEDENEN SCHLAGVERFAHREN]
Helmut Mayer (Institut fuer Meteorologie der Forstlichen Forstlichen Forschungsanstalt, Muenchen) *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 113-116 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A01

From the research program Rejuvenescence of the Mountain Mixed Forest, preliminary results are shown about the microclimatic conditions in the mountain mixed forest at different cut procedures. Author

N79-26654# Bern Univ. (Switzerland).
A COMPARISON BETWEEN THE BERNESE JURA AND BERNESE ALPS, BASED ON THE SPRING AND AUTUMN PHENOLOGIC PHASES [VERGLEICH ZWISCHEN BERNER JURA UND BERNER OBERLAND VORGENOMMEN AUF GRUND ZEWIER PHAENOLOGISCHER EREIGNISSE AUS FRUEHLING UND HERBST]
Richard Volz *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978

p 117-120 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Observations of the apple bloom and the leaf coloration of the beech tree were used as indicators to compare the vegetative development between the Bernese Jura and the Bernese Alps. At the same altitude the phenophases in the Jura are later in Spring and earlier in Autumn than in the Alps. The difference increased with height. While the mean delay of the apple bloom was 4.9 days per 100 m in the Jura, it was 3.5 days in the Alps. For the leaf coloration of the beech tree, no linear correlation with height could be found. J.A.M.

N79-26655# Aeronautica Militare Italiana, Rome.
OUTLINE OF APENNINE METEOROLOGY [ABBOZZO DI UNA METEOROLOGIA APPENNINICA]
Vittorio Cantu *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 121-124 refs In ITALIAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The main interactions of the Apennines with the atmospheric circulation were: (1) in winter-time a cushion of cold air resides for long periods in Po-Valley; (2) fohn situations are frequently observed with northern airflow over the whole Tyrrhenian slope, with western streams over the piedmont belt of the Adriatic slope; (3) during the cold season Liguria and the Tyrrhenian coast are notably warmer than Po Valley and the Adriatic coast respectively, with differences in mean January temperatures up to 8 C; (4) when a disturbance is practically stationary, rainfall is affected by a strong orographic intensification (up to the order of 1 micron/day); (5) during cold outbreaks from NW in certain latitudinal belts weather phenomena are intensified or weakened probably by orographic confluence or diffluence; and (6) sea and mountain breezes combine themselves in a single circulation from the coast to the watershed, on both Apennine slopes.
Author

N79-26656# Bern Univ. (Switzerland).
RECENT AND ICE AGE CLIMATIC ECOLOGICAL ARRANGEMENT OF THE AFRICAN HIGH MOUNTAINS BETWEEN THE MEDITERRANEAN AND THE EQUATOR [REZENTE UND KALTZEITLICHE KLIMA-OEKOLOGISCHE GLIEDERUNG DER AFRIKANISCHEN HOCHGERBIRGE ZWISCHEN MITTELMEER UND AEQUATOR]
Mathias Winiger and Bruno Messerli *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 125-128 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The three dimensional climatic ecologic arrangement of the individual African high mountain areas is connected with the meridional course of temperature and rainfall. The combination of these two climatic elements and its consequence on vegetation and morphodynamic processes is discussed. By analogy with recent morphodynamic effects of the specific climates, morphologic relicts and palynologic results are the basis of the reconstruction of the corresponding meridional course of temperature and precipitation. Temperature depressions of 6 - 8 C in East Africa and the Mediterranean (July and January) were considered. S.E.S.

N79-26657# Geneva Univ. (Switzerland).
PALEOCLIMATE OF THE NENDAZ REGION. NEW INTERPRETATION OF THE POST-WURMIAN WARMING [LE PALEOCLIMAT DE LA REGION DE NENDAZ NOUVELLES INTERPRETATIONS AUSUJET DU RECHAUFFEMENT POST-WUERMIEN]
Pierre-Louis Bieler *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 129-134 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Periglacial turf and clay which permit the bringing of data as to the variations in the climatic factor of deglaciation (CFD) during the last 9000 years were studied. It is confirmed that the Dryas 3 was no more than a stabilization stage and not that of a rise, and that the climate was stable from the Boreal until recently without the temperature having varied more than + or - 1 C. S.E.S.

N79-26658# Schweizerische Meteorologische Zentralanstalt, Zurich.
TABLE-MAPS AS A METHOD OF REPRESENTING DATA ON CLIMATE OF MOUNTAINOUS REGIONS WITH EXAMPLES FROM NORWEGIAN PHENOLOGY AND OF PRECIPITATION DISTRIBUTION OVER THE EASTERN ALPS [TABELLENKARTEN ALS EIN METHODE ZUR DARSTELLUNG VON KLIMAWERTEN IN GEBIRGSLAENDERN, MIT BEISPIELEN AUS DER NIEDERSCHLAENDERN, MIT BEISPIELEN AUS DER PHAENOLOGIE NORWEGENS UND DEM NIEDERSCHLAGSREGIME DER OSTALPEN]
Friedrich Lauscher *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 135-138 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A method of representation of climatic data in mountainous regions is presented. Many examples of applications for problems of the global climatology are reported. Table-maps for four phenological phases in Norway and for some features of the dependence of precipitation on height in the Eastern Alps are discussed. S.E.S.

N79-26659# Belgrade Univ. (Yugoslavia).
THE EFFECTS OF THE ALPS AND THE CARPATHIANS ON CLIMATE OF THE PANNONIAN PLAIN IN YUGOSLAVIA [EINFLUSS DER ALPEN UND KARPATEN AUF DAS KLIMA IN DER PANNONISCHEN EBENE IN JUGOSLAWIEN]
Natalija Todorovic and Katarina Milosavljevic *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 139-142 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The climate in the Yugoslav part of the Pannonian plain is influenced by the mountain ranges of the Alps and the Carpathians. The Alps affect the climate in the northwestern and the Carpathians in the eastern part of the plain. The climatic elements for two meteorological stations, in Vrsac and Palic, i.e. in the eastern and the northern part of the plain respectively, during the period 1950-1974 were investigated. The mostly affected climatic elements discussed include: the wind, the temperature of the air and the precipitations. S.E.S.

N79-26660# Paris VIII Univ., Villetaneuse (France).
SPRING IN THE ALPS: A STUDY OF TEMPERATURE INCREASE [LE PRINTEMPS DANS LES ALPES: ETUDE DU RECHAUFFEMENT DES TEMPERATURES]
Gisele Escourrou *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 143-146 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The temperature charts of the interior of the chain were studied. The fluctuations between the maxima and the minima of numerous weather stations were examined to determine the varying influence of the altitude. S.E.S.

N79-26661# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
TEMPERATURE AND CLOUDINESS CORRELATION IN THE REGION OF ALPS
Nadezda Sinik *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 147-149 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A series of climatological data at Zagreb (Yugoslavia) and at Basel, Lugano and Santis (Switzerland) indicates similar climatic temperature fluctuations. The temperature regimes at these localities were varied under an influence of cloudiness. S.E.S.

N79-26662# Schweizerische Meteorologische Zentralanstalt, Zurich.
CLOUDINESS SITUATION IN THE ALPINE REGION UNDER VARIOUS WEATHER CONDITIONS [DIE DEWOELKUNGS-

VERHAELTNISSE IN ALPENGEBIETBEI VERSCHIEDENEN WETTERLAGEN]
Max Schueepp *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 150 153 In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The duration of sunshine is described and represented for different weather situations. Wind vectors at 500 mbar, pressure gradients near the ground and height of the 500 mbar-level were used as parameters for the classification. S.E.S.

N79-26663# Institute of Meteorology and Hydrology, Bucharest (Rumania).
THE EXPERIMENTATION OF A BAROCLINIC MODEL WITH 5 LEVELS IN THE SOUTH-EASTERN EUROPE, INCLUDING THE OROGRAPHY EFFECT
I. U. Pescaru *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 154-158 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A baroclinic model of five levels and filtered equations is numerically integrated in the computer. At each time unit the omega equation is solved alternatively with the vorticity equation. The orographic effect is presented in the model making use of a limit condition for the omega equation at the 1000 mb level. The results obtained from the model are statistically vertified and compared to the ones obtained by a similar model for which the orographic effect was not included. S.E.S.

N79-26664# Utah State Univ., Logan.
A ONE-LAYER MODEL FOR EDDY DIFFUSIVITY PROFILES USING FIELD DATA
Gene L. Wooldridge *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 159-162 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A method is presented to enable the calculation of the vertical eddy diffusivity coefficient for momentum as a function of height. The method employs field data which was obtained from properly instrumented towers or tethered balloons. The friction velocity derived from these data strongly affects the lower levels of the diffusivity coefficient profile. The geostrophic wind speed significantly influences mid and upper levels of the profile. A stability parameter in the formulation is evaluated for a number of profiles, indicating a trend which depends on atmospheric stability. Author

N79-26665# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
THE EFFECT OF VERTICAL RESOLUTION IN A LIMITED AREA ATMOSPHERIC MODEL
Cedomir Brankovic *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 163-166 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The three factors of the vertical resolution were treated in order to examine their influence at 24 hour forecasts of surface pressure patterns and 500 mb geopotential field. The factors are varied in a limited area primitive equation model suitable for prediction with steep and small scale topography of the Alpine region. The experiments from the same initial data set, 21 July 1973, are discussed. It is shown that the changes in the vertical resolution cause the changes in the forecasting fields. S.E.S.

N79-26666# Institute of Meteorology and Hydrology, Bucharest (Rumania).
MODIFICATIONS OF THE SURFACE FRONTOGENESIS, ASSOCIATED WITH SIMPLE OROGRAPHY IN AN ISENTROPIC MODEL
Ion Draghici *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 167-169 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Numerical integrations were performed on a 12 level model with two of the isentropic surfaces intersecting the earth's surface. The model is used to simulate the atmospheric cyclo and frontogenesis from a normal mode solution for a realistic baroclinic wave. The simulations are compared laying particular stress on the modifications occurred in relation to the surface frontogenesis. S.E.S.

N79-26667# Schweizerische Meteorologische Zentralanstalt, Zurich.
FINE-MESH NUMERICAL FORECASTING IN SWITZERLAND [FEINMASCHIGE NUMERISCHE PROGNOSEN IN DER SCHWEIZ]
Walter Kuhn *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 170-171 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Diagnostic procedures for the dynamic computation of vertical wind components over mountainous terrain from large-scale numerical analyses or predictions were developed as a tool for objective precipitation forecasting. The underlying fine-mesh grid had a grid distance of 35 km. Truly prognostic procedures are planned for the near future. Author

N79-26668# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
A CONTRIBUTION TO THE PROBLEM OF PARAMETRIZATION OF CONVECTION CLOUDS IN CONNECTION WITH MACROSCALE CIRCULATION [EIN BEITRAG ZUM PROBLEM DER PARAMETRISATION DER KONVECTIONSWOLKEN IN DER VERBINDUNG ZU DEN STROEMUNGEN DER MAKROSKALE]
Branko Gelo *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Metorol., Vol. 1 1978 p 172-174 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The cloud radar echoes, during the summer period 1973-1977, are presented, as intensity parameters of the convective systems. The cloud heights were studied in relation to the pressure field in the Alps region, as well as in relation to the wind velocity and the vertical wind shear from the sounding data. J.A.M.

N79-26669# Hamburg Univ. (West Germany).
SPECTRAL PRESENTATION OF ERRORS OF NUMERICAL WEATHER FORECAST [FEHLER NUMERISCHER WETTERVORHERSAGEN IN SPEKTRALER DARSTELLUNG]
Guenter Fischer and Irene Bernhardt *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 175-178 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The numerical 24 and 48 hour forecasts and initial analysis of the 500 mb height field, were expanded into Fourier series along certain latitudinal circles (45 deg, 55 deg, 65 deg) with the aim to study the amplitude and phase errors within the zonal spectrum. The main object is the presentation of systematic amplitude errors in various forms. J.A.M.

N79-26670# Consiglio Nazionale delle Ricerche, Bologna (Italy).
TRANSPORT AND DEPOSITION OF SAHARAN DUST OVER ALPS
Franco Prodi and Giorgio Fea *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 179-182 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Filters from ten years (1968-1977) of continuous air sampling at the station of Plan Rosa (3480 m.s.l.) were inspected in order to separate, by color and amount of deposit, the apparent cases of transport of dust from Sahara Desert to the Alps. About 34 such cases were evidenced, and the corresponding meteorological situations discussed. Typical situations are: straight transport, diverted with anticyclonic rotation, and diverted with cyclonic rotation. The relevance of the phenomenon to the alpine climate is also discussed. J.A.M.

N79-26671# Savezni Hidrometeoroloski Zavod, Belgrade (Yugoslavia).
INCLUSION OF THE OROGRAPHIC ERROR IN THE

NUMERICAL FORECAST MODEL
Petar Gburcik *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 183-185 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Differences between the predicted and real upper-air and sea-level pressure distribution charts were studied. Error fields were formed, and it was found that regularities exist in the life cycle of error patterns. Regular behavior of these error patterns made it possible to formulate prognostic rules and to obtain predicted error field. Predicted error field was used for the improvement of prognostic charts. This was done in a man-machine procedure. J.A.M.

N79-26672# Belgrade Univ. (Yugoslavia).
SOME MESOSCALE METEOROLOGICAL PHENOMENA INDUCED BY THE MOUNTAIN
Mladjen Curic *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 186-188 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The equation for pressure change along the streamline at the windward side of mountain by condensation of individual air parcel is presented. The different vertical velocity of air parcel and change of condensed water in air produced faster decrease of pressure with height than given by static system. At the top of mountain, the pressure can be greater for one or two mb than in surrounding atmosphere at the same height. J.A.M.

N79-26673# Institute of Meteorology and Hydrology, Bucharest (Rumania).
THE ANALYSIS OF THE INFLUENCE OF THE ROMANIAN CARPATHIANS UPON WIND FORECASTING IN ROMANIA
Popescu Gheorghita and Militaru Florica *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 189-191 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The deformations undergone by the wind in crossing the Carpathians, is dependent on the orientation and shape of the slopes, and on the height and succession of the mountaineous massifs. A microscale analysis was performed by means of a grid, having 67.5 km sections. A computing program helped to establish the relation between real wind and geostrophic wind, introducing an altitude influence term in the expression of the respective components. Specific nomograms were drawn for each relief unit. J.A.M.

N79-26674# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
OBJECTIVE CROSS SECTION ANALYSIS
Drazen Glasnovic *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 192-195 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The objective cross section analyses, based on thermal sounding observations as input data, are shown. The technique employed a Hermite polynomial interpolation scheme in the isentropic coordinate system. The method was applied to the analyses of zonal cross sections on 22 July 1973 12 GMT. The results emphasized the large energy involved in a process of upper level frontogenesis during an approach of relatively warm polar stratosphere and the cold subtropical troposphere at the tropopause discontinuity above the Alps region. Author

N79-26675# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).
A CASE STUDY OF FRONTAL DEVELOPMENTS IN THE ALPS REGION
Vesna Jurcec *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 196-199 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The development of a frontal zone over Alps, during the period 21-23 July 1973, is discussed. The basic characteristic of this situation is an approach of subtropical and polar atmosphere with their respective jet streams. The results of the numerical prediction are presented, using an eight level limited area primitive equation model with or without orography. It is suggested that orography modifies the flow pattern through the entire troposphere during the course of development, but the frontogenesis in a low tropospheric layer is not an oreigenic process. Orography also dictates the place of strongest frontal activity. Author

N79-26676# Servizio Meteorologico dell'Aeronautica Militaire (Italy).
CONTRIBUTION OF OROGRAPHY, THERMAL WIND, AND TRANSIENT EDDIES TO QUASISTATIONARY WAVES [CONTRIBUTO DI OROGRAFIA, FORZAMENTO TERMICOE PERTURBAZIONI MOBILI ALLE ONDE QUASI-STAZIONARIE]
Lodovico LaValle *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 200-203 refs In ITALIAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A dynamical semi-statistical model was used to study the contributions of orography, thermal forcing, and transient eddies to the quasi-stationary waves superimposed upon the zonal current of the atmosphere. J.A.M.

N79-26677# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
SIMULTANEOUS MEASUREMENTS FROM THREE MOTOR-GLIDERS OF TEMPERATURE AND HUMIDITY HORIZONTAL DISTRIBUTION IN A CROSS-SECTION OF THE INN VALLEY EAST OF INNSBRUCK UNDER CONDITION OF MOUNTAIN AND VALLEY WINDS CIRCULATION [ZUR HORIZONTALEN TEMPERATUR UND FEUCHT-EVERTEILUNG EINES INNTALQUERSCHNITTES OESTLICH VON INNSBRUCK BEI BERG UND TALWINDZIRKULATION NACH SIMULTANMESSUNGEN MIT 3 MOTORSEGLERN]
Manfred E. Reinhardt and Hermann Willeke *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 204-207 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

First results of simultaneous airborne cross section measurements of horizontal structure of temperature and humidity in the Inn Valley east of Innsbruck with 3 identically equipped motor-gliders are given. Author

N79-26678# Innsbruck Univ. (Austria).
SOUTH FOEHN, NORTH FOEHN, AND TEMPERATURE PEAKS AT INNSBRUCK AND BOZEN [SUEDFOEHN, NORDFOEHN UND DIE TEMPERATURMAXIMA VON INNSBRUCK UND BOZEN]
Michael Kuhn *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 208-210 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Maximum temperatures at Innsbruck and Bozen are associated with two different weather situations. Under continued high pressure influence the basin of Innsbruck is favored thermally compared to Bozen where turbulent mixing is stronger. With short lived high pressure systems the monthly maxima of potential temperature in summer are higher in Bozen than in Innsbruck. The thermodynamic effect of northerly Foehn on the temperature maxima in Bozen is overshadowed by the associated cold air advection. Almost half of the monthly maxima in summer in Innsbruck are accompanied by southerly Foehn situations. In the region of Tirol, the effect of Foehn is that of a south wind rather than a fall wind. Author

N79-26679# Marie Curie-Sklodowska Univ., Lublin (Poland).
PECULIAR HUMIDITY-THERMAL CONDITIONS IN A CARPATHIAN MOUNTAIN VALLEY IN RELATION TO DIFFERENT WEATHER TYPES [DIE FEUCHTIGKEITS-THERMISCHEN SONDERBARKEITEN DES GEBIRGSTALS BEI AUSGEWAEHLTEN WITTERUNGSTYPEN IN DEN KARPATEN]
Edward Michna and Stanislaw Paczos *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 211-215 In GERMAN; ENGLISH

summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Some results of the field studies of the local and microclimate of the upper part of the Strwiaz valley with a particular consideration of thermohumidity conditions are presented. An attempt was made to determine their differences in relation to land relief and weather type. G.Y.

N79-26680# Schweizerische Meteorologische Zentralanstalt, Zurich.

TOPOGRAPHY OF THE 0 DEG ISOTHERM IN THE NORTHERN ALPS IN WINTER TIME [LA TOPOGRAPHIE DE L'ISOTHERME 0 DEG SUR LES ALPES DU NORD DURANT L'HIVER]

Henri Voiron (Station Meteorologique, Saint-Martin d'Heres Iseres, France) *In its* Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 216-219 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

With the help of a daily map, isohypses of the zero degree isotherm surface were obtained. The zero degree isotherm surface was derived from values obtained with arounded radiosondes and with values calculated from temperatures measured above surface of mountainous stations. Analyses are being done on the retained parameter with comparison of weather-types during three winters. G.Y.

N79-26681# Hydrometeorological Inst. of the Socialist Republic of Croatia, Zagreb (Yugoslavia).

AIR TEMPERATURE AND HEAT ENERGY BALANCE IN DINARIC ALPS

Nada Plesko *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 220-222 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Dinaric Alps make a natural division between the narrow sea-shore region of the Adriatic sea and the inland territory. Differences in temperature regimes of Dinaric Alps southern and northern slopes were investigated on an energetic basis. A correlation between heat balance components and temperature climatic normals are mathematically described. G.Y.

N79-26682# Hohenheim Univ., Stuttgart (West Germany).

TIME VARIATIONS OF SUNSHINE AND SUN RADIATION IN THE EASTERN ALPS REGION? [ZEITLICHE AENDERUNGEN VON SONNENSCHEIN UND STRAHLUNG IM OSTALPINEN BEREICH?]

W. Mueller *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 223-226 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Relative sunshine duration, global and direct sun radiation on clear days of a few lowland and high mountain's stations in the Eastern Alps-region (1950-1975) are investigated concerning possible oscillations during the period of record. A small decrease could be shown only for the radiation at the lowland stations. But this decrease is not necessarily related with anthropogenic influences (dust particles). Author

N79-26683# Slovak Academy of Sciences, Bratislava (Czechoslovakia). Geophysical Inst.

CERTAIN CHARACTERISTICS OF THE ATMOSPHERIC TURBIDITY [EINIGE CHARAKTERISTIKEN DER TRUEBUNG DER ATMOSPHAERE]

Lukac Jan *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 227-228 ref In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The spectral measurements of the direct solar radiation by Volz-sunphotometer on Skalnate Pleso and in Bratislava in the year 1976 are basis for the evaluation of: the turbidity coefficient B sub 50, B sub 88, the water vapor content of the atmosphere PW, the exponent alpha characterizing the aerosol size distribution and of the height of the homogenous turbid atmosphere H sub d. Author

N79-26684# Ljubljana Univ. (Yugoslavia).

TIME AND SPACE VARIABILITY OF SUNSHINE DURATION IN MESOSCALE

Andrej Hocevar *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 229-232 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

On the basis of hourly values of sunshine duration at three locations in the northeastern part of Slovenia (ten years' observation period) time and space characteristic variations are evaluated. Author

N79-26685# Jagellonian Univ., Cracow (Poland). Inst. for Climatology.

GLOBAL SOLAR RADIATION IN A VERTICAL PROFILE OF THE CARPATHIANS [DIE SONNENGLOBALSTRAHLUNG AM SENKRECHTEN PROFIL DER KARPATEN]

Mieczyslaw Hess and Zygmunt Olecki *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 233-235 In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The differentiation of annual, seasonal and monthly totals of the global solar radiation in the vertical profile of the northern slope of the Carpathians is discussed. On the basis of data from the period 1971 - 1973 the dependence between solar radiation and altitude is analyzed. G.Y.

N79-26686# Innsbruck Univ. (Austria).

RADIATION BALANCE AT 2 HIGH-ALTITUDE ALPINE STATIONS DURING THE VEGETATION PERIOD [DIE STRAHLUNGSBILANZEN ZWEIER HOCHALPINER STATIONEN WAEHREND DER VEGETATIONSPERIODE]

Michael Staudinger *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol. Vol. 1 1978 p 236-239 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

In summer 1976 the radiation balance of two stations in 1980 and 2580 m a.s.l. in the Otztal Alps was measured during the vegetation period. Radiation conditions are strongly modified by temporary snow covers. The comparison of stations in different altitude, shows the influence of disturbances above and below the snow line. The height interval of 600 meters permits the determination of the vertical gradients of the radiation characteristics. Author

N79-26687# Deutscher Wetterdienst, Weihenstephan (West Germany). Agrarmeteorologische Forschungstelle.

ENERGY BALANCE OF AN ALPINE PASTURE, ILLUSTRATED BY AN EXAMPLE FOR A DAY OF THE 1976 DRYNESS PERIOD [DER ENERGIEHAUSHALT EINER ALNWIESE DARGESTELLT AM BEISPIEL EINES TAGES AUS DER TROCKENPERIODE VON 1976]

Hans Haeckel *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 240-242 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The energy-bilanz of a mountain-pasture calculated for July 7, 1976 is presented. This day lay within the dryness-period of the year 1976. It is shown, that during the day the net-radiation is relatively small and in the night it is very strongly negative because of the dryness of the plant-stand. The BOWENS-ratio is about 0.8. The soil-heat-flux is relatively great and has a maximum in the fore-noon. Author

N79-26688# Thessaloniki Univ. (Greece). Inst. of Meteorology and Climatology.

THE MOUNTAIN MASS OF OLYMPUS AS A HEATING SOURCE OF THE LOWER TROPOSPHERE

Haralambos S. Sahsamanoglou *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 243-246 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The effect of the mountain mass of Olympus on the ambient air temperature with emphasis on the influence of the local

(and quite increased) cloudiness and wind upon the temperature of Olympus' mountain mass, exceeding that of free air was studied. Temperature lapse rates, near the slopes and away from them as well and within the free air, are used to determine the particular features of the mountain mass summit, and also the particular role of the local ground relief, which in combination with the direction of air masses' motion produces upward and downward motions during the warm season. Measurements effected at 12:00 GMT are used. A.R.H.

N79-26689# Technische Universitaet, Munich (West Germany).
QUANTITATIVE EVALUATION OF THE SHORT-WAVE RADIATION BALANCE OF A GLACIER [QUANTITATIVE ERFASSUNG DER KURZWELLIGEN STRAHLUNGSBILANZ EINES GLETSCHERS]
Heidi Escher-Vetter *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 247-250 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

With a large-scale map, it is possible to calculate the spatial and time-dependent variations of the potential short wave radiation income of a terrain. A comparison with measured values delivers the true short wave radiation income. Daily photographs give some hints for the determination of albedo and the short wave radiation balance. Author

N79-26690# Innsbruck Univ. (Austria).
INVESTIGATION OF WATER TABLE ON THE KESSELWANDFERNER (OETZTAL ALPS) IN A 30 m DEEP FIRN PIT, A SYNOPSIS [UNTERSUCHUNGEN DER WASSERTAFEL AM KESSELWANDFERNER (OETZTALER ALPEN) AN EINEM 30 m TIEFEN FIRNSCHACHT. KURZFASSUNG]
W. Ambach, M. Blumthaler, H. Eisner, P. Kirchlechner, H. Schneider, H. Behrens (Inst. fuer Radiohydrometrie der Ges. fuer Strahlen- und Umweltforsch. (GSF)), H. Moser (Inst. fuer Radiohydrometrie der Ges. fuer Strahlen- und Umweltforsch. (GSF)), H. Oerter (Inst. fuer Radiohydrometrie der Ges. fuer Strahlen- und Umweltforsch. (GSF)), W. Rauert (Inst. fuer Radiohydrometrie der Ges. fuer Strahlen- und Umweltforsch. (GSF)), and H. Bergmann (Inst. fuer Radiohydrometrie der GSF, Graz) *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p251-253 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The formation of the water saturated firn layer (water table) in the accumulation area was investigated over a three year period. The water table is extended over the entire accumulation area. The depth of the water table beneath the glacier surface decreases towards the equilibrium line. The water table forms at the beginning of the ablation period. The thickness of the water saturated firn layer (thickness of the water table) reacts with a delay of ca. 3 days to changes in atmospheric conditions. During heavy ablation, daily variations were observed with the same delay. During winter the water saturated layer is removed. The flow in the water table was investigated by injection of dye into the water table. Author

N79-26691# Zentralanstalt fuer Meteorologie und Geodynamik, Vienna (Austria).
PROBABILITY OF THE MEAN SUM OF MONTHLY PRECIPITATION IN THE AUSTRIAN ALPS [ZUR WAHRSCHEINLICHKEIT DER MITTLEREN MONATSNIEDERSCHLAGSSUMEN IN DEN OESTERREICHISCHEN ALPEN]
Franz Nobilis (Hydrographisches Zentralbuero) and Gunter Wihl *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 254-257 ref In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Using a gamma distribution, the probability of the mean sum of monthly precipitation for 476 stations with long record in Austria was calculated. The results are discussed. Author

N79-26692# Centre National de la Recherche Scientifique, Grenoble (France). Lab. de Biologie Vegetale.
SPATIAL AND TEMPORAL FLUCTUATIONS OF PRECIPITATIONS WITHIN AN INTRA-ALPINE AREA AS FUNCTION OF GENERAL ATMOSPHERIC CIRCULATION (EXAMPLES TAKEN IN SAVOY) [FLUCTUATIONS SPATIO-TEMPORELLES DES PRECIPITATIONS D'UNE ZONE INTRA-ALPINE EN FONCTION DE LA CIRCULATION ATMOSPHERIQUE GENERALE (EXEMPLES PRIS EN SAVOIE)]
Huguette Vivian and Serge Martin *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Metoerol., Vol. 1 1978 p 258-262 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A statistical analysis of annual rainfalls of internal alpine area (Maurienne, Tarentaise, Beaufortin, Combe de Savoie) exhibits an anomaly in their spatial distribution during the years 1940-1950. A study of the European atmospheric circulation for these years shows a decrease of frequency for western oceanic types (W-SW) comparatively with the years 1951-1968 (decrease of 50%). Such a decline of percentage for this type of oceanic circulation, accountable of the largest part of annual rainfalls for the North of the Alps, is shown by a clear decrease of the precipitations for pluviometric stations very well exposed to this influence (deficiency of 10 to 20%); but the pluviometric stations protected from this circulation by orographics obstructions, usually zone of dryness, are characterized by the constancy of their precipitations. Author

N79-26693# Etablissement d'Etudes et de Recherches Meteorologiques, St. Martin d'Heres (France).
STATISTICAL ANALYSIS OF PRECIPITATIONS IN THE FRENCH ALPS [DETERMINATION STATISTIQUE DES PRECIPITATIONS SUR LES ALPES FRANCAISES]
J. P. Navarre and R. Clement *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 263-266 In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A statistical model is presented for rapidly determining the quantitative distribution of the snow falls on the French Alps, from measurements obtained at a few meteorological stations. The statistical analysis of these falls, rests on a simple classification of the types of weather. The method is described and some of the results obtained during the winter of 77-78 are given. The limitations and interest of this sort of approach are mentioned. A.R.H.

N79-26694# Genoa Univ. (Italy). Inst. Geofisico.
THE PRECIPITATION IN THE PERIOD FROM 6-10 OCTOBER 1977 OVER THE CENTRAL LIGURIA [LE PRECIPITAZIONI DEL 6-10 OTTOBRE 1977 SULLA LIGURIA CENTRALE]
Ignazio Pagnino, Giuseppe Flocchini, and Carlo Palau *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 267-270 refs In ITALIAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The very intense shower that struck a narrow area of Central Liguria and Piedmont Appennines (high valleys of the orba and Stura) is examined. Author

N79-26695# Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Munich (West Germany). Inst. fuer Radiohydrometrie.
SPATIAL AND TEMPORAL VARIATIONS OF THE ISOTOPIC COMPOSITION OF PRECIPITATIONS AT THE ALPS PERIPHERY [RAEUMLICHE-ZEITLICHE VARIATIONEN DER ISOTOPENGEHALTE RANDALPINER NIEDERSCHLAEGE] c48
Willi Stichler and Andreas Hermann *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 271-275 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The spatial distribution of isotope contents in precipitation is studied by using a small catchment area (18.7 sq km, 670-1801 m a.s.l.) at the northern periphery of the Alps as a test field. For this purpose, the influences of elevation, horizon-

tal distance and amount of precipitation can be separated, and isotope contents are related to the origin of air masses. These relationships are also confirmed by the discussion of seasonal isotope variation in precipitation at mean areal altitude. Author

N79-26696# Eidgenoessische Anstalt fuer das Forstliche Versuchswesen, Birmensdorf (Switzerland).
INORGANIC NITROGEN CONTENT OF PRECIPITATION IN THE LOWER ALPS [DER ANORGANISCHE STICKSTOFFGEHALT IM NIEDERSCHLAG EINES VORALPENGEBIETES]
Hans M. Keller *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 276-280 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The input of inorganic nitrogen in precipitation was monitored during a 16 month period in a valley of the northern prealps of Switzerland. The mean weighted concentration for both NO3-N and NH4-N is 0.31 mg/l, the total inorganic nitrogen input for the conditions of mean annual precipitation of 2000 mm - is estimated at 12.4 kg N per ha and year. During winter, the concentrations are about half of those observed in the summer. It is possible that these seasonal trends stand in relation to the winds from northerly directions in the summer as well as to the frequency of thunderstorms. A.R.H.

N79-26697# Institut Royal Meteorologique de Belgique, Brussels.
THE EFFECT OF GROUND RELIEF UPON THE EXTREME VALUES OF INTENSITY AND DURATION OF PRECIPITATION IN BELGIUM. METHODS AND RESULTS [L'INFLUENCE DU RELIEF SUR LES VALEURS EXTREMES DE L'INTENSITE ET DE LA DUREE DES PRECIPITATIONS EN BELGIQUE]
R. Sneyers *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 281-283 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Distributions of the maximum intensity of precipitation during time intervals varying from 5 min to 24 hours, and of the maximum duration of precipitation in Belgium were determined using the annual maximum intensities measured at Uccle as a basis. The monthly maximum of the duration of precipitation at Uccle, given by a Hellmann rainfall recorder, follows a log-normal distribution and the law of the annual maximum was derived by using the law of the composition independent probabilities. For Belgium, it may be assumed that in the coastal region, the durations are about 20% smaller than in the central part of the country, but that on the south-eastern heights the durations are 40% larger. A.R.H.

N79-26698# Thessaloniki Univ. (Greece).
THE OROGRAPHIC EFFECT OF MOUNT PILION AND THE EUBOEA ISLAND (GREECE) ON DISTRIBUTION OF PRECIPITATION [L'INFLUENCE DE L'OROGRAPHIE DE L'EUBEE ET DU PILION (GREECE) SUR LA DISTRIBUTION DES PRECIPITATIONS]
Panagiotis Maheras *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 284-287 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

A general view of the rainfall regime is given for both the maritime windward side, and the continental leeward side of Euboea Island. The relative frequencies of daily precipitation, classified as light rains, moderate, heavy, very heavy, rainstorms and heavy showers, and torrential showers are analyzed as well as the corresponding yields. The results obtained are interpreted from the geographic, synoptic and aerological point of view. A.R.H.

N79-26699# Eidgenoessisches Institut fuer Schnee- und Lawinenforschung, Weissfluhjoch/Davos (Switzerland).
PROBABILITY AND PRODUCTIVITY OF IMPORTANT SNOWFALLS IN THE MOUNTAINS, PARTICULARLY IN THE REGION OF DAVOS [WAHRSCHEINLICHKEIT UND ERGIEBIGKEIT VON GROSSSCHNEEFAELLEN IM GEBIRGE, INSBESONDERE IN DER REGION DAVOS]
Paul M. B. Foehn *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 288-292 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

With the aid of long snowfall series from Weissfluhjoch (41 years) and Davos (77 years) duration and intensity of snowfall periods were analyzed. The statistical theory of extreme values was also applied to forecast further extremes. In order to yield specific design criteria for the avalanche zoning a new term: 'Increase of total snow depth during snowfalls' was introduced and subjected to the statistics of extremes. Data from various Alpine stations show the range of extreme values, which one might expect in a period of 100 years. R.E.S.

N79-26700# Belgrade Univ. (Yugoslavia).
THE RATIO OF THE NUMBER OF DAYS WITH SNOW COVER TO THAT WITH SNOWFALL IN THE SERBIAN MOUNTAINS OF YUGOSLAVIA [VERHALTNIS DER TAGE MIT SCHNEEDECKE ZU DEN TAGEN MIT SCHNEEFALL IN DEN GEBIRGSGERIETEN SERBIENS IN JUGOSLAWEN]
Katerina Milosavljevic and Natalija Todorovic *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 293-296 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The number of days with snow cover and snow fall for 10 climatological stations with altitudes from 820 to 1710 m, as well as for 12 from 42 to 545 m, from the eastern, middle, and southeastern regions of Serbia in Yugoslavia, based on data concerning a period of 25 years, is reported. Factor Q, representing the relation of the number of days with snow cover and those with snowfall, was calculated. In order to illustrate the obtained results, some other meteorological elements and parameters for five typical meteorological stations from the same region were evaluated and analyzed. R.E.S.

N79-26701# Genoa Univ. (Italy). Ist. Geofisico.
GEOGRAPHICAL DISTRIBUTION OF ICE FORMATION IN LIGURIA [LA DISTRIBUZIONE GEOGRAFICA DELLE FORMAZIONI DI GHIACCIO IN LIGURIA]
Giuseppe Flocchini, Carlo Palau, and Elio Tessore *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 297-300 refs In ITALIAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

On the basis of the observations of the damages in Liguria caused to the vegetation and to handmade items of glaze and rime, the critical areas of Liguria were delimited and the geographical distribution of these was discussed from the standpoint of mountainous-topographical elements. R.E.S.

N79-26702# Parma Univ. (Italy).
SNOW ON THE PO WATERSHED OF THE NORTHERN APENNINES [LA NEVOSITA SUL VERSANTE PADANO DELL'APPENNINO SETTENTRIONALE]
Guglielmo Zanella *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 301-304 refs In ITALIAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Snow in a tract of the Northern Apennines, on their Po valley side was investigated. The seasonal averages of the snow days, snow amount, and snow cover, calculated for 62 stations, followed an exponential correlation with the altitude. The relative frequency and the nivometrical coefficient were briefly considered. The existence of a sub-regional differentiation was discussed. R.E.S.

N79-26703# Direction de la Meteorologie Nationale, Paris (France).
SITUATIONS CAUSING LATE SNOWFALL OVER THE FRENCH ALPS [SITUATIONS A L'ORIGINE DE CHUTES DE NEIGE TARDIVES SUR LES ALPES FRANCAISES]

Jacques E. Duclay *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 305-307 refs In FRENCH; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Typical situations generating the snowfalls observed at the beginning of spring were studied and schematized. The general features of spring disturbances were determined and applied in improving the weather forecasting of the French Alps region. R.E.S.

N79-26704# Institute of Meteorology and Hydrology, Bucharest (Rumania).
ICE DEPOSITIONS IN RUMANIAN MOUNTAINOUS REGIONS
Elena Tepes *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 308-312 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The distribution of parameters regarding the ice deposition on conductors in mountainous regions of Rumania is presented. The main factors which play an important part in ice deposition formation were found to be altitude, relief, mountain chain direction, and slope orientation. R.E.S.

N79-26705# Institute of Meteorology and Hydrology, Bucharest (Rumania).
AN OBJECTIVE ANALYSIS OF THE CLIMATOLOGICAL PARAMETERS OF THUNDERSTORM ACTIVITY OVER THE RUMANIAN CARPATHIANS
Maria Pascu and Maria Iliescu *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 313-315 refs (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Using the monthly and annual data obtained by audio visual observations on the thunderstorms and the recordings on the flash counters at meteorological stations in the Rumanian Carpathians, functional interdependence was established as existing among the climatological parameters of the thunderstorm activity. The parameters which were found to be interdependent are: (1) the number of thunderstorm days, (2) the number of thunderstorms, (3) the latter's duration, and (4) the number of electric discharges. R.E.S.

N79-26706# Wien Univ. (Austria). Zentralanstalt fuer Meteorologie und Geodynamik.
CLIMATOLOGY OF THUNDERSTORMS AND HAIL IN AUSTRIA [ZUR GEWITTER- UND HAGELKLIMATOLOGIE VON OESTERREICH]
Konrad Cehak *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 316-319 In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The number of days with thunderstorm and the number of days with hail during the vegetation period (May to September) were statistically analyzed. Figures representing the areal distribution of the mean values of the distributions of days with thunderstorm or hail show that those zones in Austria which have the highest number of days with thunderstorm or hail, are warmest in the same period of the year. The variability of the frequencies was discussed. The percentage of the days with hail in relation to those with thunderstorm is shown by mean values and extremes. R.E.S.

N79-26707# Eidgenoessische Technische Hochschule, Zurich (Switzerland).
A POSTER: METEOROLOGICAL EXPERIMENTS IN THE FRAMEWORK OF THE 4TH LARGE-SCALE HAIL SUPPRESSION TEST IN SWITZERLAND [POSTER: METEOROLOGISCHE EXPERIMENTE IM GROSSVERSUCH 4 ZUR HAGELABWEHR IN DER SCHWEIZ]
Bruno Federer, Patrick Haechler, Hans-Heinrich Schiesser, Willy Schmid, Bruno Thalmann, Albert Waldvogel, and Martin Zimmerman *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 320 In ENGLISH and GERMAN (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

In a randomized field experiment, the Soviet method of hail suppression using large, high altitude silver-iodide rockets was tested. The basic experimental design, the prior determined statistical evaluation method and the results of the different meteorological experiments which were conducted within the framework of this field experiment are presented. R.E.S.

N79-26708# Technische Universitaet, Munich (West Germany).
DESIGN OF DISTRIBUTION MAPS OF PRECIPITATION, EVAPORATION, AND RUNOFF IN THE ALPS [DER ENTWURF VON VERTEILUNGSKARTEN FUER NIEDERSCHLAG, VERDUNSTUNG, UND ARFLUSS IN DEN ALPEN]
A. Baumgartner, E. Reichel, and G. Weber *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 321-324 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The derivation of the water balance in the Alps can be based on existing precipitation maps. Measurements are available only for discharge, however not for evaporation. Maps for evaporation result from linear relationship between evaporation = precipitation-discharge, and air temperatures or altitudes under use of topographical maps with minor corrections for small P values. The maps for discharge originate finally by subtraction of the values in the maps for precipitation and evaporation. R.E.S.

N79-26709# Karlsruhe Univ. (West Germany).
NUMERICAL SIMULATION OF RIVER ICING, DEPENDING ON METEOROLOGICAL PARAMETERS, USING THE LOISACH IN UPPER BAVARIA AS AN EXAMPLE [NUMERISCHE SIMULATION VON FLUSSVEREISUNGEN IN ABHAENGIGKGIT METEOROLOGISCHER PARAMETER AM BEISPIEL DER LOISACH/OBERBAYERN]
Norbert Witte *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 325-328 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

The possibilities of simulating the influence of a ground water taking on the icing of an Alps river were demonstrated in a numeric model. Depending on meteorological and hydrological parameters some icing profiles were calculated. The assumption of intensified icing as a result of ground water taking which seems logical at first only proved to be correct under disadvantageous conditions. R.E.S.

N79-26710# Eidgenoessische Technische Hochschule, Zurich (Switzerland). Lab. fuer Atmosphaerenphysik.
PRELIMINARY REPORT ON PLANNING OF THE GARP MOUNTAIN SUB-PROGRAM (ALPEX) [ZWISCHENBILANZ DER PLANUNG DES GARP MOUNTAIN SUB-PROGRAMME (ALPEX)]
Hans Richner *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 329-332 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

Objectives and recommendations for the theoretical studies were formulated and field experiment scientific objectives were defined for the sub-program: Air flow over and around mountains. The parameters which are necessary for the investigation, their resolution and accuracy as well as the methods of measuring them were proposed. R.E.S.

N79-26711*# M&S Computing, Inc., Huntsville, Ala.
CAT INFORMATION DISPLAY SYSTEM USERS MANUAL Final Report
P. L. Alley and E. L. Lucas 30 Apr. 1979 56 p (Contract NAS8-33089)
(NASA-CR-161243; Rept-79-017) Avail: NTIS HC A04/MF A01 CSCL 04B

Executed on a PDP-11/35 computer, the clear air turbulence (CAT) real-time data acquisition and display system collects, stores, and processes wind shear data obtained from laser Doppler

velocimeters. The hardware and software configurations required to execute the CAT program are described as well as the operator control program, the data collection task, and the magnetic tape format. The data display provides near real-time feedback of wind shear activity within the viewing volume. The flexible X-Y plot routine which provides a variety of displays for examining the wind shear characteristics is also examined. Examples of displays from the execution of the real-time simulation program are included. A.R.H.

N79-26712# Finnish Meteorological Inst., Helsinki.
RESULTS FROM AN ATTEMPT TO INTERPOLATE TEMPERATURE AND WIND PROFILES WITH RESPECT TO TIME WITH A ONE-DIMENSIONAL BOUNDARY LAYER MODEL
Pentti Vaajama, Erkki Rantakrans, and Sakari Kajosaari Apr. 1978 26 p refs
(TR-18; ISBN-951-697-105-9) Avail: NTIS HC A03/MF A01

A one dimensional boundary layer model with simplified boundary conditions is presented. A method of evaluating the vertical exchange coefficient K sub z from temperature profile was developed. The computed temperature and wind profiles were compared with observations in three different cases. The results show that the model was able to predict satisfactorily the most fundamental features of the development of temperature profiles. Author

N79-26713# Finnish Meteorological Inst., Helsinki.
ON THE DIURNAL VARIATION OF VISIBILITY AND FOG IN FINLAND
Raino Heino Apr. 1978 21 p refs
(TR-19; ISBN-951-697-106-7) Avail: NTIS HC A02/MF A01

Mean visibility varied in Finland between 10 and 40 km depending on the time of day and time of year. The frequency of low visibilities was relatively small. The highest frequencies of fog were 15-20% at sunrise in inland areas. Fogs most usually lasted for one to four hours. The frequencies of thin fog and mist resembled that of fog. The frequency of surface fog, occurring mainly around dawn in summer, varied between 5 and 35% depending on the location. R.E.S.

N79-26714# Finnish Meteorological Inst., Helsinki.
ACOUSTIC RADAR AND ITS USE IN METEOROLOGY
Olli Turpeinen Apr. 1978 30 p refs
(TR-20; ISBN-951-697-109-1; ISSN-0355-1733) Avail: NTIS HC A03/MF A01

Acoustic radar returns were compared to data obtained from a meteorological tower 20 km away on the coast. The sounder provided useful information on many important phenomena. Sodar proved to be unique in one respect: it could be used to determine qualitative temperature profiles. Scattered acoustic power also contained quantitative information on the thermal structure of the atmosphere. Several applications of sodar were discussed. Author

N79-26715*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE 1977 INTERTROPICAL CONVERGENCE ZONE EXPERIMENT
I. G. Poppoff, ed., W. A. Page, ed., and A. P. Margozzi, ed. Jun. 1979 493 p refs
(NASA-TM-78577; A-7780) Avail: NTIS HC A21/MF A01 CSCL 04B

Data are presented from the 1977 Intertropical Convergence Zone (ITCZ) Experiment conducted in the Panama Canal Zone in July 1977. Measurements were made daily over a 16-day period when the ITCZ moved across the Canal Zone. Two aircraft (Learjet and U-2) flew daily and provided data from horizontal traverses at several altitudes to 21.3 km of ozone, temperature, pressure, water vapor, aerosols, fluorocarbons, methane, nitrous oxide, nitric oxide, and nitric acid. Balloonsondes flown four times per day provided data on ozone, wind fields, pressure, temperature, and humidities to altitudes near 30 km. Rocketsondes provided daily data to altitudes near 69 km. Satellite photography provided detailed cloud information. Descriptions of individual experiments and detailed compilations of all results are provided. For individual titles, see N79-26716 through N79-26729.

N79-26716*# Washington Univ., Seattle. Dept. of Atmospheric Sciences.
THE INTERTROPICAL CONVERGENCE ZONE EXPERIMENT: BACKGROUND AND SUMMARY
James R. Holton *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 1-4 ref (For primary document see N79-26715 17-47)
Avail: NTIS HC A21/MF A01 CSCL 04B

The Intertropical Convergence Zone Experiment (ITCZ) was the first in an anticipated series of observational programs designed to explore the nature and magnitude of troposphere-stratosphere exchange processes. The overall meteorological background and motivations for a measurement program in the ITCZ are summarized and the nature of the field experiments are briefly described. G.Y.

N79-26717*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
OPERATIONAL ACTIVITIES
William A. Page *In its* The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 5-12 (For primary document see N79-26715 17-47)
Avail: NTIS HC A21/MF A01 CSCL 04B

A short description of the observational field program as carried out in the Canal Zone during July 1977 is presented. The people responsible for organizing the activity and those deployed to the Canal Zone, who were responsible for various aspects of the field activity (including the experiments) are listed. The ozonesonde balloon and rocketsonde launches and the aircraft flight track are shown. The daily activity schedule during the 16-day Intertropical Convergence Zone study is shown. The instrument configuration of the U-2 research aircraft used during the experiment is also shown. G.Y.

N79-26718*# Oregon State Univ., Corvallis.
NOTES ON THE METEOROLOGY OF THE INTERTROPICAL CONVERGENCE ZONE DURING THE JULY 1977 EXPERIMENT
Edwin F. Danielson *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 13-26 (For primary document see N79-26715 17-47)
Avail: NTIS HC A21/MF A01 CSCL 04B

The stratosphere and troposphere are large-scale open systems which exchange mass and trace constituents. If averaged over all longitudes, mass exchange can be expressed as products of the means and the mean of the product of the deviations from the mean. At high latitudes, the mass exchange is dominated by the deviations from the mean. At low latitudes, in the tropics, it is generally assumed that the mass exchange is caused by the mean motion. Figures are presented which depict: Northern Hemisphere mean motion; Convergence Zone motion; clouds and their motions; surface pressure variations; and meteorological parameters such as temperature, relative humidity, and ozone mixing ratios. G.Y.

N79-26719*# National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.
BALLOON-BORNE OZONESONDE AND ROCKET TEMPERATURE AND WIND DATA GATHERED DURING THE JULY 1977 INTERTROPICAL CONVERGENCE ZONE EXPERIMENT
Francis J. Schmidlin and Gregg Kloos *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 27-34 refs Prepared in cooperation with Dayton Univ. Res. Inst., Ohio (For primary document see N79-26715 17-47)
Avail: NTIS HC A21/MF A01 CSCL 04B

In middle latitudes, it is possible for large concentrations of stratospheric air to be brought down to the tropopause through folds or breaks in the tropopause. The exchange of air from the tropopause into higher altitudes is not well understood. Thus, the ITCZ (Intertropical Convergence Zone) experiment, conducted from July 16 through July 31, 1977, included a series of balloon-borne ozone soundings. The results of these soundings are presented and explain in the vertical exchange of air and provide information on the short vertical scales-of-motion. Rocketsonde data was also gathered in the ITCZ experiment in support of a stratospheric scales-of-motion study. The investigation was to determine whether rocketsonde and satellite information currently used yield information on the stratospheric horizontal

wave spectrum and its importance with respect to tropospheric and mesospheric interaction and transport. G.Y.

N79-26720*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

MEASUREMENT OF NO AND O3 FROM AIRCRAFT: 1977 TROPICAL CONVERGENCE ZONE EXPERIMENT

W. L. Starr, M. Loewenstein, and R. A. Craig *In its* The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 35-50 (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

As part of the Ames Research Center program to explore the nature of stratosphere-troposphere exchange processes occurring in the Intertropical Convergence Zone, simultaneous in situ measurements of nitric oxide and ozone mixing ratios were made with the Ames stratospheric air sampler SAS 2. The SAS 2 is a second-generation system; it employs four parallel sensors and was designed primarily for measurements at altitudes of 60,000 ft and above on the U-2 stratospheric research aircraft. The only modifications required for this study was the addition of an air sample flow restrictor. Data were obtained with the SAS 2 system on July 26, 27, 30 and 31, 1977. Generally, 30-min measurements were made at each of six altitudes ranging from 45,000 ft to 70,000 ft, and separated by 5,000 ft intervals. G.Y.

N79-26721*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

TRACE CONSTITUENT MIXING RATIOS IN THE LOWER STRATOSPHERE DURING THE 1977 INTERTROPICAL CONVERGENCE ZONE EXPERIMENT

J. F. Vedder, C. O. Boitnott, B. J. Tyson, E. C. Y. Inn, and Dean Ohara (LFE Corp., Richmond, Calif.) *In its* The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 51-60 ref (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

Minor constituents in the atmosphere can play an important role as tracers in studies of atmospheric transport and mixing. Simultaneous measurements of the vertical distribution of trace constituents in the troposphere and lower stratosphere were conducted in the region of the Intertropical Convergence Zone (ITCZ). An effort was made to measure the mixing ratios of selected trace constituents. A cryogenic sampling system on board a U-2 aircraft was used to acquire whole-air samples and to cryogenically collect samples at 13.7 to 21.3 km. Simultaneous tropospheric measurements using whole-air sampling canisters on board a Learjet aircraft were also carried out. G.Y.

N79-26722*# Washington State Univ., Pullman.

DETERMINATION OF TRACE GASES IN LEARJET AND U-2 WHOLE AIR SAMPLES COLLECTED DURING THE INTERTROPICAL CONVERGENCE ZONE EXPERIMENT

Dagmar Rais Cronn and Elmer Robinson *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 61-106 refs (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

The contribution of Washington State University (WSU) to the Intertropical Convergence Zone (ITCZ) study, conducted in the Panama Canal Zone in July 1977 is reported. The ITCZ program had the objective to study the meteorology and air chemistry to determine, if possible, the magnitude of injection of tropospheric air into the stratosphere in the ITCZ. WSU was responsible for two phases of the air chemistry program for the ITCZ study: (1) the collection of whole-air samples from ground level to 13.7 km using a Learjet as a sampling platform, and the analysis of the samples for selected halocarbons, C2 hydrocarbons, N2O, and SF6; and (2) the analysis for selected halocarbon species and N2O of low pressure whole-air samples, collected between 13.7 km and 21.3 km by a U-2 aircraft. The report is divided into separate sections describing the Learjet and the U-2 sampling methods, analytical methods, and results. Complete data tables for all samples analyzed are given. G.Y.

N79-26723*# Washington State Univ., Pullman.

INTERTROPICAL CONVERGENCE ZONE OZONE PROFILES FROM THE LEARJET OZONE ANALYZER

Elmer Robinson *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 107-110 (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

An ozone analyzer operated as part of the sampling package aboard the NASA Learjet on each flight in the Panama ITCZ (Intertropical Convergence Zone) experiment. The measurement program was not successful because of instrument failure, apparently due to high humidity effects on one or more components of the ozone sensing instrument. A brief description of the experimental installation and some comments about an apparent correlation between very low ozone concentrations and cloud layers at altitude are presented. G.Y.

N79-26724*# Denver Univ., Colo.

PRELIMINARY RESULTS FROM THE UNIVERSITY OF DENVER INFRARED SPECTROMETER - 1977 INTERTROPICAL CONVERGENCE ZONE EXPERIMENT

D. B. Barker, D. G. Murcray, W. J. Williams, and A. Goldman *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 111-126 (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

The Denver University Infrared Spectrometer (DUIRS) is a liquid-helium-cooled emission radiometer designed to study minor atmospheric constituents. DUIRS flew on 12 data flights during the 1977 Intertropical Convergence Zone experiment. No data were obtained on the flight from Wallops Island to Panama because of a power failure or on the return flight to Wallops Island because of a cryogen line freeze-up. The data coverage on the nine vertical profile flights that were flown before the freeze-up are shown. Typical spectra and variations as a function of U-2 (research aircraft) altitude are also shown. Radio metric data and rawinsonde temperature data were used to perform band model calculations to obtain molecular number densities in the column above the aircraft at each altitude. G.Y.

N79-26725*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

STRATOSPHERIC AEROSOLS IN THE INTERTROPICAL CONVERGENCE ZONE, PANAMA CANAL ZONE

Neil H. Farlow, Guy V. Ferry, Homer Y. Lem (LFE Corp., Richmond, Calif.), and Dennis M. Hayes (LFE Corp., Richmond, Calif.) *In its* The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 127-144 refs (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

To investigate whether injection sources of the stratospheric aerosol layer could be detected in the tropical stratosphere, an examination of the aerosol vertical and horizontal size distribution around the Intertropical Convergence Zone (ITCZ) at the Panama Canal Zone was performed during the summer of 1977. By comparing these data with similar measurements in temperate and polar regions, it was hoped to discover variations in particle size that would indicate whether a young aerosol is forming and entering the stratosphere at the ITCZ; where the aerosol matures; and finally, where it reenters the troposphere. The methods used in the investigations and the results obtained from the analyses are described. G.Y.

N79-26726*# National Oceanic and Atmospheric Administration, Boulder, Colo. Atmospheric Physics and Chemistry Lab.

U-2 WATER VAPOR BURDEN OBSERVATIONS THROUGH THE TROPOPAUSE

P. M. Kuhn *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 145-152 (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

A U-2 aircraft provided a platform for an infrared radiometer inferring water vapor burdens associated with the Intertropical Convergence Zone. Flight altitudes were 16 to 23 km. The radiometer system, coupled with an algorithm to produce an inverse solution of the radiative transfer equation, resulted in an rms error of 20 percent in the inferred water vapor burden. A unique, bivariate solution including radiance and vertical temperature profiles produced an essentially real-time solution for the water vapor burden. Results of the July 1977 missions over the Canal Zone region between latitudes 7.5 degrees N and 11.0 degrees N are presented. G.Y.

N79-26727*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

AIRBORNE PRESSURE AND TEMPERATURE MEASUREMENTS DURING THE 1977 INTERTROPICAL CONVERGENCE ZONE EXPERIMENT

Robert M. Munoz *In its* The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 153-164 refs (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

During the 1977 ITCZ (Intertropical Convergence Zone) experiment in Panama two aircraft and numerous balloon-borne radiosonde instruments were equipped to measure pressure and temperature. The experiment was a coordinated effort to evaluate the meteorological conditions that prevailed from July 17 through 31, 1977. A critical analysis of the data collected on one of the aircraft (the Lear jet) operating at altitudes to 13,000 m for about 2 hr each day during most days of the experiment is presented. The discussion includes a comparison of the vertical profiles of potential temperature obtained from the Learjet with those obtained from balloons launched at Ft. Sherman. Time histories of pressure, temperature, and potential temperature, as observed from the Learjet are also presented. G.Y.

N79-26728*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.

PRESSURE AND TEMPERATURE MEASUREMENTS FROM THE U-2 AIRCRAFT DURING THE 1977 INTERTROPICAL CONVERGENCE EXPERIMENT

James F. Vedder *In its* The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 165-174 ref (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

For the study of the Intertropical Convergence Zone, the aircraft provided pressure and temperature data to supplement the radiosonde records. The results obtained from the U-2 aircraft during the six flights of the cryogenic and whole-air sampling system on July 18, 19, 23, 25, 28, and 29, 1977, are presented. G.Y.

N79-26729*# National Aeronautics and Space Administration. Wallops Station, Wallops Island, Va.

BALLOON-BORNE ECC OZONESONDE DATA, APPENDIX A

Francis J. Schmidlin and Greg Kloos *In* NASA. Ames Res. Center The 1977 Intertrop. Convergence Zone Expt. Jun. 1979 p 175-347 Prepared in cooperation with Dayton Univ. Res. Inst., Ohio (For primary document see N79-26715 17-47)

Avail: NTIS HC A21/MF A01 CSCL 04B

Data tables and graphs are presented for balloon sounding data acquired during the 1977 Intertropical Convergence Zone experiment. G.Y.

N79-26730# Committee on Science and Technology (U. S. House).

NATIONAL WEATHER SERVICE ACT OF 1978

Washington GPO 1978 1013 p refs Hearings on H.R. 13715 (successor to H.R. 8763) before the Subcomm. on Transportation, Aviation and Weather of the Comm. on Sci. and Technol., 95th Congr., 2d Sess., 23-25 May; 6-8 Jun.; 21-22 Jul. 1978

(GPO-31-606) Avail: Subcomm. on Transportation, Aviation and Weather

Congressional hearings are presented on a bill to improve the operational weather programs of NOAA. This bill would update and clarify existing statutory authorities and functions conducted by the national weather service. J.A.M.

N79-26731# Weather Wing (1st), Hickam AFB, Hawaii.

THE USE OF 1WW HISTORICAL TERMINAL FORECAST PERFORMANCE TABLES

Phillip D. Wood and John A. Ellington 15 Mar. 1979 16 p refs

(AD-A067093; Rept-1WW-TN-79-1) Avail: NTIS HC A02/MF A01 CSCL 04/2

This report describes the various elements of the 1WW historical terminal forecast performance tables. Numerous ways the tables can be used are described and illustrated. The 1WW historical terminal forecast performance data are a one-of-a-kind diagnostic aid used to measure and demonstrate unit technical ability and performance. Author (GRA)

N79-26732# Naval Research Lab., Washington, D. C.

FEASIBILITY OF SHIPBOARD LASER-ATTENUATION MEASUREMENTS WITH A PORTABLE TRANSMISSOMETER Interim Report

H. Gerber 26 Feb. 1979 23 p refs

(WF52551715)

(AD-A067665; AD-E000286; NRL-8290) Avail: NTIS HC A02/MF A01 CSCL 04/2

A 2-meter-long cell has been devised in which aerosol extinction and scattering coefficients can be measured simultaneously. Extinction is obtained by measuring the change in the intensity of a HeNe laser beam which is stepped through the cell for a total path length of 20 meters. A reciprocal nephelometer consisting of a sensor with a precise Lambertian response is mounted on the side of the cell to give a direct measure of the scattering coefficient. Filling the cell with ambient aerosol that has been concentrated centrifugally increases the effective path length of the beam in the cell to 300 meters. The cell was taken on the 1977 EOMET cruise of the USNS Hayes in order to determine its capabilities when exposed to the rigors of a ship's environment. The variance of data collected during the cruise was analyzed. The mean resolution limit of the transmittance measurements made during the cruise was + or - 0.16%. This limit was primarily influenced by mechanical instabilities in the nephelometer operated precisely. Vibrations from the ship's machinery was damped out successfully. An improved cell could increase the resolution by a factor of 10 or more. Absorption coefficients of the aersol particles in the eastern North Atlantic and in the Mediterranean were plotted. This technique has potential in the infrared. Author (GRA)

N79-26733# Regis Coll., Weston, Mass.

METEOROLOGICAL STUDIES: ATMOSPHERIC ANALYSIS, AUTOMATED WEATHER SYSTEM DEVELOPMENT, SATELLITE STUDIES Final Report, 28 Sep. 1976 - 30 Nov. 1978

S. Leonarda Burke 28 Feb. 1979 188 p refs

(Contract F19628-77-C-0010)

(AD-A067937; AFGL-TR-79-0047) Avail: NTIS HC A09/MF A01 CSCL 04/2

This report details research efforts in three areas of meteorology. In atmospheric analysis, a number of modeling experiments were performed which explored the flux-profile relationships in the atmospheric surface layer. In mesoscale forecasting, automated procedures were developed to: (1) specify the type and intensity of surface weather phenomena and (2) exploit indirect methods to specify and predict landing zone slant visual range. In satellite studies, data acquired by the McIDAS (Man-computer Interactive Data Access System) were used to perform analyses in the following areas: the physical properties of clouds; the objective extraction of satellite-sensed vertical surroundings; the use of imagery data for investigating automated short range forecasting techniques; the objective specification of cloud type from DMSP (Defense Meteorological Satellite Program) very high resolution satellite imagery. GRA

N79-26734# Atmospheric Sciences Lab., White Sands Missile Range, N. Mex.

THE 12831D LANCE MISSILE NO. 2486, ROUND NO. 325 DSL (18 JANUARY 1979)

Mar. 1979 46 p

(DA Proj. 1T6-65702-D-127)

(AD-A067675; ECOM-DR-986) Avail: NTIS HC A03/MF A01 CSCL 04/2

Meteorological data gathered for the launching of 12831D Lance, Missile number 2486, Round number 325 DSL, are presented in tabular form. Author (GRA)

N79-26735# Airborne Research Associates, Weston, Mass.

AIRBORNE MEASUREMENTS IN SUPPORT OF A FIELD TEST OF THE STABILIZATION OF SUPERSIZED WATER DROPLETS: PILOT EXPERIMENT Final Report

Ralph Markson 14 Mar. 1979 13 p

(Contract N00019-78-M-0330)

(AD-A067645) Avail: NTIS HC A02/MF A01 CSCL 04/2

This report is concerned with the Navy's need for screening by particulate matter or fog, for various applications including camouflage and electromagnetic sensing. Certain hygroscopic material such as the Salty Dog effluent can be generated by pyrotechnic devices. These have been found to produce foggy plumes when released in moist stable air. Therefore it is appropriate within the NAVAIR aerosol program to examine meteorological conditions which would influence the formation and dissipation of such plumes. GRA

N79-26736# National Physical Lab., Teddington (England).
[ACTIVITIES OF THE DIVISION OF QUANTUM METROLOGY] Annual Report, 1976
1976 42 p
(NPL-QU-AR-76) Avail: NTIS HC A03/MF A01

An account of the progress in various areas of research including standards is given together with detailed descriptions of selected items such as work in cryogenic metrology, air pollution measurements, and ultraviolet spectral emission standards. Publications and lectures presented are also included.
Author (ESA)

N79-26737# Royal Netherlands Meteorological Inst., De Bilt.
OBJECTIVE CLASSIFICATION OF DAILY 500 mbar PATTERNS [OBJECTIVE CLASSIFICATION VAN DAGELIJKSE 500 mbar PATRONEN]
1978 38 p refs In DUTCH; ENGLISH summary
(KNMI-WR-78-8) Avail: NTIS HC A03/MF A01

Classification systems based either on principal components or on a cluster analysis technique (k-means method) were studied. Basic data consisted of the geopotential heights of the 500 mbar level measured each day at noon during the period January 1, 1949 to December 31, 1974. The heights were transformed to pattern heights, adjusting for seasonal variation. The statistical techniques used are described. Basic patterns obtained are used to describe daily patterns, including variance, as a combination of zonality with meridonally together with (anti)cyclonality. Results indicate that it would be useful to replace subjective systems by a principal components system as they are shown to perform best. Author (ESA)

N79-26738# Royal Netherlands Meteorological Inst., De Bilt.
COMPARATIVE INVESTIGATION OF DYNAMIC PROPERTIES OF SOME PROPELLER VANES
W. A. A. Monna 1978 34 p refs
(KNMI-WR-78-1) Avail: NTIS HC A03/MF A01

The dynamic properties of three types of propellar s (Gill vane vanes type 8002D and 35003D, Koshin vane type MV-110) were investigated in a windtunnel. The distance constant, damping ratio, and damped wavelength of the various instruments compare well with the dynamic properties of a cup anemometer wind vane combination used on the 213 m mast at Cabauw in the Netherlands. Tests show an improvement in the accuracy of wind measurements can be achieved by replacing the cup anemometer wind vane combination by propeller vanes. Other advantages are the elimination of mutual interference from the wind speed sensor and the wind direction sensor independent of wind direction and the need for only a single instrument position. Mainly for reasons of sturdiness and compactness the Gill vane type 8002D was finally chosen to replace the cup anemometers and wind vanes on the 213 m mast.Author (ESA)

N79-26739# Fondazione Ugo Bordoni, Rome (Italy).
RELATIONSHIP BETWEEN RAINGAUGE TIPPING VOLUME AND RAIN RATE DISTRIBUTIONS
Ugo Merlo and Mauro DAndria Oct. 1977 16 p refs
(FUB-32-1977) Avail: NTIS HC A02/MF A01

Some prediction methods for rain induced attenuation of electromagnetic waves require the knowledge of rainfall rate distributions up to very low probabilities (0.001 to 0.00001%). In order to obtain this data tipping bucket raingage behavior was investigated, expecially at high rain rates. A reduction effect on rainfall rate distributions caused by tipping bucket raingages is shown. A general procedure for evaluating the actual reduction is proposed. Results were obtained from measured data at Rome (1975-1976) and Fucino (1975-1977). Results show that the reduction effect is important in making attenuation predictions at frequencies above 10 GHz. Author (ESA)

N79-26740# Stockholm Univ. (Sweden). Dept. of Meteorology.
THE IMI NETWORK IN SWEDEN: PRESENT EQUIPMENT, METHODS, AND PLANS FOR IMPROVEMENT
Lennart Granat, Rolf Soederlund, and Leif Baecklin 7 Nov. 1977 28 p refs Prepared in cooperation with Intern. Meteorol. Inst., Stockholm
(Contracts SWED-EPB-7-117/75; SWED-NSRC-G-0223-061) (AC-40) Avail: NTIS HC A03/MF A01

The IMI network in Sweden is designed to collect monthly air and rainwater samples in rural locations and has now been in operation for more than 20 years. The present extent of the network is shown. Earlier and present equipment is described in some detail and analytical schemes mentioned briefly. Improvements, under way or planned for the near future, with regard to network design, sampling equipment, and analytical methods are indicated and discussed in relation to the purpose of the network. Author (ESA)

N79-26741# Oklahoma Univ., Norman. Dept. of Meteorology.
A CONTRIBUTION TO THE SEVERE STORMS INTERCEPT PROJECT, 1978 Final Report, Mar. - Dec. 1978
B. Bluestein, J. McGinley, D. Bowman, D. Carmichael, D. Engles, M. Jain, C. Kessinger, B. Moyer, E. Rasmussen, and D. Rusk Dec. 1978 72 p refs
(Grant NOAA-04-78-B01-11)
(PB-293472/7; NOAA-79022801) Avail: NTIS HC A04/MF A01 CSCL 04B

Visual observations of Doppler radar-observed storms, movies of tornadic debris clouds, photograph severe storm structure and supplementary forecasting information were provided. The intercept crews took normal speed movies of tornado debris, of a rotating wall cloud near the ground at the location of a Doppler-observed tornado vortex signature, and of multiple vortices in a tornado-like gust fron dust whirl. Time-lapse movies were taken of mammatus, visual life histories of several rotating thunderstorms, a rotating 'wall cloud', funnel clouds and lowered cloud bases. The results of the study contribute to determining the usefulness of the Doppler radar as a severe weather warning tool and help spotters recognize potentially dangerous storms. GRA

N79-26742# National Weather Service, Salt Lake City, Utah.
A SIMPLE ANALYSIS/DIAGNOSIS SYSTEM FOR REAL TIME EVALUATION OF VERTICAL MOTION
Scott Heflick and James Fors Feb. 1979 33 p refs
(PB-294216/7; NOAA-TM-NWS-WR-138; NOAA-73031302) Avail: NTIS HC A03/MF A01 CSCL 04B

Qualitative or quasi-quantitative determination of vertical motion from synoptic reasoning is familiar to all operational forecasters. Consideration of vorticity advection, temperature advection, divergence and convergence, differential heating, and orographic effects have long been used by the forecaster as aids in producing precipitation forecasts. A diagnostic vertical motion model using a simple, modified Cressman objective analysis technique and a new 'one-level' version of the quasi-geostrophic omega equation is investigated. The program is designed to run on an AFOS-type minicomputer. The diagnosed vertical motion field is compared with satellite and precipitation data. The results are in good agreement with the observed data, except in data-poor areas and for weak, small-scale systems. Some applications of this technique to operational forecasting are discussed. GRA

N79-26743# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
DIAGNOSTIC ANALYSES OF THE GATE A/B SCALE AREA AT INDIVIDUAL TIME PERIODS
William M. Frank Nov. 1978 112 p refs
(Grant NSF ATM-75-01424)
(PB-292961/0; AS-PAPER-297; ISSN-0067-0340) Avail: NTIS HC A06/MF A01 CSCL 04B

GATE rawinsonde data are analyzed at all individual time periods. Moisture and static energy budgets are performed over the A/B area. Budget derived rainfall exceeds radar estimates, particularly during periods of light rainfall. The radar rainfall lags budget condensation by 4-6 hours. Temperature changes of the tropical troposphere are more dependent upon radiational heating

than latent heat release although condensation does act to warm the upper troposphere and cool lower levels. Frictional convergence is a relatively minor component of GATE A/B scale divergence. GRA

N79-26744# National Weather Service, Salt Lake City, Utah.
LFM 24-HOUR PREDICTION OF EASTERN PACIFIC CYCLONES REFINED BY SATELLITE IMAGES
John R. Zimmerman and Charles P. Ruscha Jan. 1979 42 p refs
(PB-294324/9; NOAA-TM-NWS-WR-137; NOAA-79031301) Avail: NTIS HC A03/MF A01 CSCL 04B

In looking at the Limited Fine Mesh (LFM) forecasts of surface cyclone central pressure, it was found that on eleven days between April and November 1977, observed surface cyclone central pressure was 10 mb or more lower than anticipated by the LFM model. A common property found on GOES satellite imagery at the time of undetected cyclone deepening in these eleven cases was the formation of a distinct, sharp, cloud-free slot region on the back side of the leaf-shaped clouds of the barocinic zone. It was seen that as frequently as two or three times a month the LFM failed to predict significant cyclone development in the eastern Pacific. Satellite images provided the experienced meteorologist with evidence that cyclones would deepen when this development was not predicted by the LFM. GRA

N79-26745# National Oceanic and At nospheric Administration, Washington, D. C. Federal Coordinator for Meteorological Services and Supporting Research.
NATIONAL SEVERE LOCAL STORMS OPERATIONS PLAN
Richard E. Hallgren Jan. 1979 48 p
(PB-294326/4; FCM-79-1; NOAA-79030506) Avail: NTIS HC A03/MF A01 CSCL 04B

The responsibilities of the various United States agencies which provide meteorological services in observing and forecasting severe local storms are reported. GRA

N79-26746# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
FEASIBILITY STUDY OF SATELLITE-BORNE LIDAR GLOBAL WIND MONITORING SYSTEM
R. M. Huffacker, ed. Sep. 1978 314 p refs
(PB-293879/3; NOAA-TR-ERL-WPL-37; NOAA-79030706) Avail: NTIS HC A14/MF A01 CSCL 04B

The Wave Propagation Laboratory (WPL) of the National Oceanic and Atmospheric Administration's Environmental Research Laboratories completed the Phase 1 investigation of the feasibility of measuring global atmospheric wind fields using a satellite-borne coherent lidar system. The investigation used detailed analytical and physical models to simulate the wind-measurement process. NOAA-DMSP objectives and requirements, and the operational space environment were considered. Coherent lidar systems were shown to be capable of measuring the global wind field. The details of the Phase 1 study are presented. GRA

N79-26747# National Weather Service, Fort Worth, Tex.
MANUALLY DIGITIZED RADAR DATA: INTERPRETATION AND APPLICATION
Paul L. Moore and Daniel L. Smith Jan. 1979 30 p refs
(PB-293810/8; NOAA-TM-NWS-SR-99; NOAA-79030501) Avail: NTIS HC A03/MF A01 CSCL 04B

The implementation of the manually digitized radar (MDR) program led to a wide variety of applications of the data and has greatly increased the use of radars involved in the program. Considerable emphasis is placed on hydrologic applications, in large part because of the urgency of the flash flood problem and the relative sparsity of other real-time precipitation data. Date are shown to be useful in updating probability of precipitation forecasts. Computer compatibility of the data made it possible to format, display, and archive it for transmission and briefing, development of synoptic climatologies of radar echoes, and quality control of radar information. Moisture analysis for numerical models is a potential application. New displays which combine satellite and digital information are proposed as useful forecast aids. GRA

N79-26748# Oklahoma Univ., Norman. Dept. of Physics and Astronomy.
RESEARCH ON SEVERE LOCAL STORMS Final Report, Jan. - Sep. 1978
David E. Golden Sep. 1978 14 p refs
(Grant NOAA-04-78-B01-8)
(PB-293924/7; NOAA-79022710) Avail: NTIS HC A02/MF A01 CSCL 04B

The design and construction of a corona probe for measurement of electric fields at the earth's surface are described. A theoretical study was made of electric field changes in association with lightning to compare results with experimental data. GRA

N79-26749# Florida State Univ., Tallahassee.
SEVERE STORMS RESEARCH Final Report
J. J. Stephens Sep. 1978 51 p refs
(Grant NOAA-05-06-022-44011)
(PB-294129/2; NOAA-79022802) Avail: NTIS HC A04/MF A01 CSCL 04B

The statistical structure of severe storms was investigated. Statistical information was incorporated in optimal objective analysis and experimental design on the mesoscale. The data of ten severe storm events, five from each year (1974 and 1977) were chosen from the available data. The events were assumed to be statistically independent since each event was characterized as an individual cell as indicated by radar reflectivity patterns. GRA

N79-26750# National Oceanic and Atmospheric Administration, Boulder, Colo. Atmospheric Physics and Chemistry Lab.
PROJECT STORMFURY: EXPERIMENTS AND OUTLOOK
Helmut K. Weickmann Dec. 1978 33 p refs
(PB-294210/0; NOAA-TM-ERL-APCL-21; NOAA-79031401) Avail: NTIS HC A03/MF A01 CSCL 04B

The evidence of seeding effects, following Stormfury experiments, were investigated. With the exception of Ginger, all hurricanes were seeded at temperatures below -20 C. For this reason, it cannot be assumed with certainty that a dynamic effect was caused. In one case the true effect of seeding was observed, namely, in hurricane Ester. This hurricane was sufficiently close to land that it was surveyed by a land based 10 cm radar set. The disappearance of the 10 cm radar echo one hour after seeding at 20.36 GMT and downstream of the seeding path is exactly what one can expect if seeding increases the number of ice crystals and eliminates liquid water. No new cloud formation was indicated due to the unchanged radar return and the visual appearance of the clouds. GRA

N79-26751# Colorado State Univ., Fort Collins. Dept. of Atmospheric Science.
DIURNAL VARIABILITY IN THE GATE (GARP ATLANTIC TROPICAL EXPERIMENT) REGION
Jean M. Dewart Nov. 1978 89 p refs
(Grant NSF ATM-75-01424)
(PB-292998/2; AS-PAPER-298) Avail: NTIS HC A05/MF A01 CSCL 04B

The observational evidence for and the probable causes of the large diurnal variablity of the atmosphere over the inter Tropical Convergence Zone (ITCZ) region of the tropical eastern Atlantic Ocean are discussed. The analysis is based on the observational information of the A/B scale rawinsonde data of the GARP Atlantic Tropical Experiment (GATE). A large single cycle diurnal oscillation of wind divergence similar to that observed in the western Atlantic and western Pacific oceans is found. Maximum divergences occur in the late morning, mimimum in the early evening. Boundary layer divergence profiles show almost identical divergence for both convectively enhanced and convectively suppressed conditions. Tropospheric diurnal temperature variation was investigated. GRA

N79-26752# Illinois State Water Survey, Urbana.
RECORD WINTER STORMS IN ILLINOIS, 1977 - 1978
Stanley A. Changnon, Jr. and David Changnon 1978 30 p refs Prepared in cooperation with Ill. Dept. of Registration and Education, Springfield
(PB-293181/4; ISWS/RI-88/78; W79-05013) Avail: NTIS HC A03/MF A01 CSCL 04B

The Midwest, including Illinois, experienced in 1977-1978 its most severe winter since weather records began in the early 19th century. The record winter began with three snowstorms

in late November and ended with an extremely damaging ice storm in late March. Unusual snow patterns occurred with several storms, and they lasted in Illinois much longer than usual. Weather conditions (low pressure centers) producing many of the storms were more often of Canadian origin than usual, and these lows had lower pressure and moved slower than normal, resulting in higher surface winds and longer lasting and hence more severe storms. Cold temperatures coupled with the frequent snowstorms resulted in record long-lasting snow cover with up to 120 days with 1 inch or more cover in northern Illinois and 90 days in southern Illinois. GRA

48 OCEANOGRAPHY

Includes biological, dynamic and physical oceanography; and marine resources.

N79-26753 California Inst. of Tech., Pasadena.
TSUNAMIS: THE PROPAGATION OF LONG WAVES ONTO A SHELF Ph.D. Thesis
Derek Garard Goring 1979 355 p
Avail: Univ. Microfilms Order No. 7912923

Comparisons of experiments with solitary and cnoidal waves (long waves of permanent form) with the predictions of various theories indicate that, apart from propagation, the reflection of waves from a change in depth is a linear process except in extreme cases. However, the transmission and the propagation of both the transmitted and the reflected waves in general are nonlinear processes. Exceptions are waves with heights which are very small compared to the depth. For these waves, the entire process of propagation onto a shelf in the vicinity of the shelf is linear. Tsunamis propagating from the deep ocean onto the continental shelf probably fall in this class. Dissert. Abstr.

N79-26754# SACLANT ASW Research Center, La Spezia (Italy).
SATELLITE OCEANOGRAPHY OF EASTERN BOUNDARY CURRENTS AND ITS IMPLICATIONS TO ASW
Robert E. Stevenson (Scripps Inst. of Oceanog., La Jolla, Calif.) 1 Nov. 1978 26 p refs Presented at Conf. on ASW in the Southwestern Approaches to the English Channel, La Spezia, Italy, 14-16 Mar. 1978
(AD-A067259; SACLANTCEN-SR-M-90) Avail: NTIS HC A03/MF A01 CSCL 08/3

The characteristics of western boundary currents are better known than those along the eastern edges of oceans. In the 1970s, however, close attention has been given to eastern boundary currents. The variability of the El Nino phenomenon off Peru, and coastal upwelling off Oregon, Peru/Chile, and Northwest Africa, have been studied by multi-national teams. Since 1975, U.S. Navy personnel and scientists sponsored by the Office of Naval Research have examined satellite imagery of the waters off California and Western Europe as a first step in real-time satellite oceanography. From these studies, we know now that eastern boundary currents have identifiable fronts (such as the Huelva front) and eddies (like the Socal eddy chain) that vary seasonally and inter-annually in intensity and scale. The fronts have lengths of tens of kilometres and depths of hundreds of metres; the eddies have diameters of 50 to 200 km and depths greater than 500 m. Both the eddies and fronts have surface temperature gradients of 1.5 C to 5 C. Deeper, the temperature gradients tend to be sharper than those at the surface. The data are useful therefore in solving tactical ASW problems. GRA

N79-26755# EG and G Washington Analytical Services Center, Inc., Rockville, Md.
AIR DEPLOYED OCEANOGRAPHIC MOORING (ADOM) Progress Report, 1978
Apr. 1979 80 p refs
(Contract N00014-79-C-0227)
(AD-A068001; EG/G-TR-D370-0001) Avail: NTIS HC A05/MF A01 CSCL 08/10

This report documents the technological accomplishments in the Air Deployed Oceanographic Mooring (ADOM) program during 1978. Technology is being developed for deploying oceanographic sensors from an aircraft in two regions of the world's oceans: the open ocean and the polar seas. Two corresponding systems are being developed: an open ocean ADOM and an Artic ADOM. Both systems are presently configured to measure temperature, conductivity, and pressure. The actions, further analysis, and investigations necessary in the continuation of the ADOM technology development are detailed. Author (GRA)

N79-26756# Semcor, Inc., Moorestown, N. J.
ATLAS OF INFRARED IMAGERY OF THE SEA SURFACE Phase Report, Nov. 1958 - Jul. 1972
Barbara J. Moser 25 Aug. 1978 124 p
(Contract N62269-77-C-0382)
(AD-A067731; NADC-78226-30) Avail: NTIS HC A06/MF A01 CSCL 08/10

This report is a collection of 192 examples of thermal imagery recorded from aircraft over bodies of water. These infrared pictures show the surface expressions of eddies, convection cells, currents, and thermal fronts in addition to sea ice, wind streaks, whitecaps, and waves. Explanatory information, such as portions of National Ocean Survey charts corresponding to some of the imagery, is provided. The imagery presented was recorded during the period May 1959 to May 1972 by seven airborne passive infrared line scanners (the Reconofax Camera; AN/AAD-2; Reconofax IV, Mark II; AN/AAR-30; AN/AAR-32; AN/AAR-35; and Reconofax XIIIA); brief descriptions of the equipment and a table of design and performance parameters are supplied. The imagery was recorded in the 3- to 5.5-micrometer and 8-to 14-micrometer spectral bands. Sensitivities of sets with the various detector types employed (Ge:Au, Ge:Cu, Ge:Hg, InSb, HgCdTe) ranged from 0.001 to 0.3 K; resolutions varied from 18.4 to 1.0 mrad. Author (GRA)

N79-26757# Delaware Univ., Newark. Sea Grant College Program.
PROCEEDINGS OF A WORKSHOP ON COASTAL SEDIMENT TRANSPORT STUDY
Dec. 1978 104 p refs Workshop held at Newark, Del., 2-3 Dec. 1976
(PB-293632/6; DEL-SG-15-78; NOAA-79022703) Avail: NTIS HC A06/MF A01 CSCL 13B

The transport partition into bed and suspended load for various particle sizes and wave characteristics is discussed as well as the distribution of sediment transport across the nearshore; the effects of rip currents on onshore-offshore transport; the modifying action of a longshore bar on transport; the mobilizing effect of onshore waves with no longshore component combined with relatively small oblique waves as compared to the effect of the oblique waves acting alone; and many other problems of equal importance. Development of methodologies and instrumentation for surf zone application essential to the understanding and quantification of these processes are considered. GRA

N79-26758# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
GRAVITY WAVE PROPAGATION IN THE PRESENCE OF A CURRENT WITH AN ARBITRARY VERTICAL PROFILE
Bob Weber Nov. 1978 31 p refs
(PB-293806/6; NOAA-TM-ERL-WPL-40; NOAA-79030707)
Avail: NTIS HC A03/MF A01 CSCL 08E

The effect of current shears upon the phase velocity of gravity waves on the ocean's surface and the resulting consequences for an HF sea echo radar which measures surface currents is presented. The phase velocities of these waves depend upon the current at all depths but with more weight given to the current near the surface. For weak shears and deep water, the weighting approaches the exponential weighting derived by Stewart and Joy. Large errors (amounting to more than 10% of the phase velocity of the gravity wave causing the sea echo) are detectable by measuring the excess separation of the advancing and receding Bragg lines in the sea echo Doppler spectrum. GRA

N79-26759# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
DATA FROM THE ATLANTIC OCEANOGRAPHIC AND METEOROLOGICAL LABORATORIES OTEC PLANT SITE STUDY IN THE GULF OF MEXICO, JULY 1977

Gregg S. Thomas, S. Michael Minton, and Robert L. Molinari Jan. 1979 137 p refs
(PB-293733/2; NOAA-TM-ERL-AOML-34; NOAA-79030710) Avail: NTIS HC A07/MF A01 CSCL 08J

Physical oceanographic data collected in July 1977 at a proposed Ocean Thermal Energy Conversion (OTEC) site in the Gulf of Mexico are presented. Data reduction techniques for all phases of the cruise are also given. All data collected aboard the NOAA Ship Researcher during July 1977 and some XBT data collected in October and November by the Researcher and Virgina Key are included. Both plots and listings are given for all CSTD, XBT, and Current Meter Profiles. In general, description of the data processing techniques for all data sets is given. GRA

N79-26760# Delaware Univ., Newark. Coll. of Marine Studies.
PARTIALLY ANNOTATED TIDAL MARSH BIBLIOGRAPHY. SECOND EDITION: SELECTED KEY WORK INDEX
Franklin C. Daiber and Ellen C. Ganzman 1978 432 p
(PB-293466/9; DEL-SG-14-78; NOAA-79022702) Avail: NTIS HC A19/MF A01 CSCL 08A

An annotated bibliography encompassing all aspects of the tidal marshes is presented. Key words were identified for general groupings of topics. Interest areas can be searched by scanning the various key words followed by author selection and title perusal. GRA

N79-26761# Oregon State Univ., Corvallis. School of Oceanography.
CTD OBSERVATIONS OFF THE COAST OF PERU, R/V MELVILLE, 4 MARCH - 22 MAY 1977, AND R/V COLUMBUS ISELIN, 5 APRIL - 19 MAY 1977
Adriana Huyer, William E. Gilbert, Richard Schramm, and Dennis Barstow Nov. 1978 408 p refs
(Contracts NSF OCE-76-00594; NSF OCE-76-04825; NSF OCE-03381)
(PB-293377/8; REF-78-18; NSF/IDOE-79/27; NSF/IDOE/CUEA/DR-55) Avail: NTIS HC A18/MF A01 CSCL 08J

Observations of temperature and salinity were made off the coast of Peru between 5 degrees S and 15 degrees S from the R/V Melville, 4 March - 22 May 1977, and the R/V Iselin, 5 April - 19 May 1977. Most of the stations were within 200 km of the Peru coast, and between 14 deg 30 min S and 16 deg S. Temperature and salinity data are presented from 430 CTD (conductivity temperature depth) stations, and from 22 bottle stations made while the CTD system was down. Vertical profiles of temperatures, salinity and sigma-t, and listings of the data at standard depths are presented for each station. GRA

N79-26695# Gesellschaft fuer Strahlen- und Umweltforschung m.b.H., Munich (West Germany). Inst. fuer Radiohydrometrie.
SPATIAL AND TEMPORAL VARIATIONS OF THE ISOTOPIC COMPOSITION OF PRECIPITATIONS AT THE ALPS PERIPHERY [RAEUMLICHE-ZEITLICHE VARIATIONEN DER ISOTOPENGEHALTE RANDALPINER NIEDERSCHLAEGE]
Willi Stichler and Andreas Hermann *In* Schweiz. Meteorol. Zentralanstalt Proc. of the 15th Intern. Meeting on Alpine Meteorol., Vol. 1 1978 p 271-275 refs In GERMAN; ENGLISH summary (For primary document see N79-26623 17-47)
Avail: NTIS HC A15/MF A01

51 LIFE SCIENCES (GENERAL)

Includes genetics.

N79-26762*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
A LONG-RANGE AND LONG-LIFE TELEMETRY DATA-ACQUISITION SYSTEM FOR HEART RATE AND MULTIPLE BODY TEMPERATURES FROM FREE-RANGING ANIMALS
Gordon F. Lund (San Jose State Univ.), Richard M. Westbrook, Thomas B. Fryer, and Rafael F. Miranda May 1979 74 p refs
(NASA-TM-78590; A-7824) Avail: NTIS HC A04/MF A01 CSCL 06B

The system includes an implantable transmitter, external receiver-retransmitter collar, and a microprocessor-controlled demodulator. The size of the implant is suitable for animals with body weights of a few kilograms or more; further size reduction of the implant is possible. The ECG is sensed by electrodes designed for internal telemetry and to reduce movement artifacts. The R-wave characteristics are then specifically selected to trigger a short radio frequency pulse. Temperatures are sensed at desired locations by thermistors and then, based on a hearbeat counter, transmitted intermittently via pulse interval modulation. This modulation scheme includes first and last calibration intervals for a reference by ratios with the temperature intervals to achieve good accuracy even over long periods. Pulse duration and pulse sequencing are used to discriminate between heart rate and temperature pulses as well as RF interference.
Author

N79-26763# Martin Marietta Labs., Baltimore, Md.
PHOTOCHEMISTRY AND ENZYMOLOGY OF PHOTOSYNTHESIS Progress Report, 1 Apr. 1978 - 31 Aug. 1978
Bessel Kok, C. F. Fowler, J. Golbeck, R. J. Radmer, and B. Velthuys Aug. 1978 12 p refs
(Contract EY-76-C-02-3326)
(COO-3326-70) Avail: NTIS HC A02/MF A01

Progress is reported in the following areas of research: light harvesting and electron transport in C4 plants; mass spectrometer studies; measurements in flashing light; spectrophotometric studies; and, redox titration of the plastoquinone pool.
Author (DOE)

N79-26764# Interuniversitair Reactor Instituut, Delft (Netherlands).
Cu-CONTENT OF THE LIVER OF YOUNG MICE IN RELATION TO A DEFECT IN THE Cu-METABOLISM
H. W. Prins and C. J. A. vanderHamer 1977 5 p refs Presented at 3d Intern. Symp. on Trace Elem. Metab. in Man and Animals (TEMA-3), Freising-Weihenstephan, Neth., 25-29 Jul., 1977
(IRI-133-77-02) Avail: NTIS HC A02/MF A01

The Cu content of the livers of young Blotchy mice was studied as a function of age. The animals have a recessive, sex-linked mutation that is probably identical to that of Menkes' disease in man; both show an impared Cu-resorption. The three phenotypes show a curve similar to that of the Swiss mice. Both show a maximum in liver-Cu coinciding with the first production of bile. The 'Menkes' mice show a curve which could be explained by a lack of cu-resorption. The heterozygous carriers show a curve very similar to that of the 'Menkes' mice. A comparable situation is found in man. Results show that Cu-therapy for Menkes' disease only has a chance to prevent brain damage, if ever, when initiated very early. Author (ESA)

N79-26765# Unilever Research, Vlaardingen (Netherlands).
PREPARATION OF SOME PROSTAGLANDIN E SUB 1 OMEGA-HOMO-PROSTAGLANDIN E SUB 1 ESTERS AND THEIR INHIBITING PROPERTIES ON RAT BLOOD PLATELET AGGREGATION
L. vanderWolf, J. Kloeze, H. J. J. Pabon, and D. A. vanDorp 1978 7 p refs
Avail: NTIS HC A02/MF A01

Various esters of omega-homo-prostaglandin E sub 1 and prostaglandin E sub 1 were prepared in a yield of 28-55% to investigate their effect on ADP-induced aggregation of rat blood platelets. The biopotency of the omega-homo-PGE sub 1-esters is about four times higher than that of the corresponding PGE sub 1-esters. Furthermore, the biopotency of aliphatic esters decreases with increasing chain length of the ester group.
Author (ESA)

N79-26766# Unilever Research, Vlaardingen (Netherlands).
INFLUENCES OF DIETARY FATS ON CORONARY FLOW RATE AND LEFT VENTRICULAR WORK OF THE ISOLATED RAT HEART
E. A. M. deDeckere and F. tenHoor 1978 21 p refs Submitted for publication
Avail: NTIS HC A02/MF A01

For one, four, or six weeks rats were fed diets containing 25% to 50% of the total digestible energy as fat, 23% as casein

and 52% to 27% as starch. The coronary flow rate and the maximum left ventricular work of hearts of rats fed sunflowerseed oil are higher than those of hearts of rats fed lard (about 15% and 10% respectively). The maximum left ventricular work is achieved at the left ventricular fill in pressure of 10 to 12 mmHg; this value is not affected by the type of dietary fat. The effect of dietary fat on the coronary flow rate is already seen after one week of feeding, and on the left ventricular work after four weeks of feeding. Analysis of variance shows a positive relationship between the maximum left ventricular work and the amount of sunflower seed oil. It is concluded that dietary fats affect the coronary flow rate and the left ventricular work of the isolated rat heart. Author (ESA)

N79-26767# Unilever Research, Vlaardingen (Netherlands).
EFFECTS OF DIETARY FATS ON THE CORONARY FLOW RATE AND THE LEFT VENTRICULAR FUNCTION OF THE ISOLATED RAT HEART
E. A. M. deDeckere and F. tenHoor 1978 21 p refs Revised Submitted for publication
Avail: NTIS HC A02/MF A01

Two groups of rats were fed diets containing large amounts (45%-50% of the total digestible energy) of sunflowerseed oil or hydrogenated coconut oil for four to five days. The left ventricular working capacity, the coronary flow rate, the oxygen consumption, the glucose uptake, and the lactate release were determined in the isolated perfused heart. The fatty acid composition of the heart phospholipids was also determined. The left ventricular working capacity and the coronary flow rate of hearts of rats fed sunflowerseed oil are higher (10%-20%) than those of rats fed hydrogenated coconut oil. Feeding the two fats for three to four weeks instead of four to five days does not alter the results. There are no or only minor differences between the two dietary groups as to the other quantities mentioned. It is concluded that dietary fats affect the properties of the heart already after a short feeding time. Author (ESA)

N79-26768# Environmental Monitoring and Support Lab., Cincinnati, Ohio.
DISTRIBUTION OF PHYTOPLANKTON IN ARKANSAS LAKES Report, 15 Mar. - 20 Nov. 1974
J. W. Hilgert (Nevada Univ., Las Vegas), F. A. Morris (Nevada Univ., Las Vegas), M. K. Morris (Nevada Univ., Las Vegas), W. D. Taylor, L. R. Williams, S. C. Hern, and V. W. Lambou Dec. 1978 60 p refs
(PB-292742/4; EPA-600/3-78-101) Avail: NTIS HC A04/MF A01 CSCL 13B

This is a data report representing the species and abundance of phytoplankton in the 16 lakes sampled by the National Eutrophication Survey in the State of Arkansas. Results from the calculation of several water quality indices are also included (Nygaard's Trophic State Index, Palmer's Organic Pollution Index, and species diversity and abundance indices). GRA

52 AEROSPACE MEDICINE

Includes physiological factors, biological effects of radiation; and weightlessness.

N79-26769 Ohio State Univ., Columbus.
TECHNIQUES OF CUMULATIVE QUANTITATIVE CHARACTERIZATION OF THE THORAX USING AUDIOSONIC METHODS Ph.D. Thesis
Christopher Krzysztof Druzgalski 1978 284 p
Avail: Univ. Microfilms Order No. 7908138

The developed system was applied to investigate characteristics of respiratory sounds and to study acoustic properties of the bronchial-lung-thoracic system using sound transmission. Studies of transmission properties of the bronchial-lung-thoracic system were conducted in animals involving simulation of pathological conditions. A modified system was applied to study humans with obstructive lung diseases under static and dynamic conditions of the respiratory system. Studies showed distinct patterns of transmission in normal or pathological states. The developed system and methodology can improve recognition and diagnostic documentation of pulmonary and/or cardiovascular disorders affecting respiratory mechanics and mechano-elastic properties of the thorax. Dissert. Abstr.

N79-26770* National Aeronautics and Space Administration, Washington, D. C.
AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 194
Jun. 1979 73 p
(NASA-SP-7011(194)) Avail: NTIS HC E03 CSCL 06E

Articles on the biological, physiological, psychological, and environmental effects to which man is subjected to during and following simulated or actual flight in the earth's atmosphere or in interplanetary space are presented. The emphasis is on applied research more than fundamental studies or theoretical principles. R.E.S.

N79-26771* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
BIOMEDICAL ULTRASONOSCOPE Patent
Robert D. Lee, inventor (to NASA) Issued 29 May 1979 12 p Filed 30 Sep. 1976 Supersedes N77-15619 (15 - 06, p 0786)
(NASA-Case-ARC-10994-2; US-Patent-4,154,230; US-Patent-Appl-SN-759965; US-Patent-Class-128-660; US-Patent-Class-73-626) Avail: US Patent and Trademark Office CSCL 06A

The combination of a C mode scan electronics in a portable, battery powered biomedical ultrasonoscope having A and M mode scan electronics. The C mode scan electronics comprises a plurality of transducer elements arranged in a row and adapted to be positioned on the skin of the patient's body for: (1) converting a pulsed electrical signal to a pulsed ultrasonic signal, (2)radiating the ultrasonic signal into the patient's body,(3) picking up the echoes reflected from interfaces in the patient's body, and (4) converting the echoes to electrical signals. Each transmitter is coupled to a respective tranducer for transmitting a pulsed electrical signal and for transmitting the convected electrical echo signals directly to the receiver.
Official Gazette of the U.S. Patent and Trademark Office

N79-26772* National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PROSTHESIS COUPLING Patent
James B. Reswick (Rancho Los Amigos Hospital Rehabilitation Center, Downey, Calif.), Vert Mooney (Rancho Los Amigos Hospital Rehabilitation Center, Downey, Calif.), Charles W. Bright, and Lester J. Owens, inventors (to NASA) Issued 26 Jun. 1979 4 p Filed 9 Feb. 1978 Supersedes N78-22721 (16 - 13, p 1754)
(NASA-Case-KSC-11069-1; US-Patent-4,158,895; US-Patent-Appl-SN-876438; US-Patent-Class-3-2; US-Patent-Class-3-1.9; US-Patent-Class-3-12) Avail: US Patent and Trademark Office CSCL 06B

A coupling for use in an apparatus for connecting a prosthesis to the bone of a stump of an amputated limb is described which permits a bio-compatible carbon sleeve forming a part of the prosthesis connector to float so as to prevent disturbing the skin seal around the carbon sleeve. The coupling includes a flexible member interposed between a socket that is inserted within an intermedullary cavity of the bone and the sleeve. A lock pin is carried by the prosthesis and has a stem portion which is adapted to be coaxially disposed and slideably within the tubular female socket for securing the prosthesis to the stump. The skin around the percutaneous arbon sleeve is able to move as a result of the flexing coupling so as to reduce stresses caused by changes in the stump shape and/or movement between the bone and the flesh portion of the stump.
Official Gazette of the U.S. Patent and Trademark Office

N79-26773# Civil Aeromedical Inst., Oklahoma City, Okla.
INDEX TO FAA OFFICE OF AVIATION MEDICINE REPORTS: 1961 THROUGH 1978
Jan. 1979 72 p refs
(AD-A067983; FAA-AM-79-1) Avail: NTIS HC A04/MF A01 CSCL 05/2

A listing of FAA aviation medicine reports is presented by year, number, author, title, and subject. R.E.S.

N79-26774# Interuniversitair Reactor Instituut, Delft (Netherlands).
RESULTS OF A 64Cu-LOADING TEST APPLIED TO PATIENTS WITH AN INHERITED DEFECT IN THEIR Cu-METABOLISM (MENKES' DISEASE)
C. J. A. vanderHamer and H. W. Prins 1977 5 p refs Presented at 3d Intern. Symp. on Trace Elem. Metab. in Man and Animals (TEMA-3), Freising-Weihenstephan, Neth., 25-29 Jul., 1977
(IRI-133-77-04) Avail: NTIS HC A02/MF A01

An oral 64Cu-loading test was applied to Menkes' patients. Results show that the shape of the plasma 64Cu-time curve is strongly influenced by the Cu-status of the patient, e.g., whether the patient has received copper parenterally. Information was also obtained on the influence of Cu-deficiency on the utilization of resorbed Cu. Author (ESA)

N79-26775# Interuniversitair Reactor Instituut, Delft (Netherlands).
THE ORAL 64Cu-LOADING TEST: APPLICATIONS AND PROBLEMS
C. J. A. vanderHamer 1977 5 p refs Presented at 15th Intern. Ann. Meeting of the Soc. of Nucl. Med., Groningen, Neth., 13-16 Sep. 1977
(IRI-133-78-02) Avail: NTIS HC A02/MF A01

Recent experiments have shown that it is possible to suppress the Cu-resorption from the G.I.-tract in Wilson patients. Using the 64Cu-loading test, which showed no initial peak in the time-activity curve, this was verified. At the same time a gammacamera was used to show that there was no uptake of 64Cu in the liver. The urinary 64Cu excretion was also lower than before treatment. An oral 64Cu-loading test as described can be quite flexible, provided additional measurements of, for example, ceruloplasmin- and albumin-bound 64Cu, liver 64Cu, urinary 64Cu excretion, and total plasma-Cu and ceruloplasmin are made. Author (ESA)

N79-26776# Unilever Research, Vlaardingen (Netherlands).
EFFECTS OF DIETARY FATS ON ATHEROSCLEROSIS AND THROMBOSIS
Gerard Hornstra and Rene Vles 1978 20 p refs Submitted for publication
Avail: NTIS HC A02/MF A01

Various laboratory experiments using animals are discussed. Results show dietary fats have a pronounced effect on arteriosclerosis in rabbits and arterial thrombosis in rats. In general long-chain saturated fatty acids are atherogenic and thrombogenic. Dietary linoleate, on the other hand, retards the development of arteriosclerosis in experimental animals whereas it has a distinct anti-thrombotic effect in rats. It lowers platelet aggregability in man and decreases the serum cholesterol content in animals and man. Moreover, linoleate corrects elevated blood pressure in animals and man. It is conceivable that these effects contribute to the lower mortality from coronary heart disease observed in men on a linoleate-rich diet. A diet low in saturated fatty acids and rich in linoleic acid is considered an effective tool in the fight against arteriosclerosis and its complications. Author (ESA)

N79-26777# Unilever Research, Vlaardingen (Netherlands).
PHYSIOLOGICAL EFFECTS OF A HIGH SOYBEAN PROTEIN DIET IN MAN
Piet vanStratum 1977 18 p refs Presented at AACC Meeting, San Francisco, 24-27 Oct., 1977 Prepared in cooperation with Central Inst. for Nutr. and Food Res. (TNO), Zeist, Neth. Submitted for publication
Avail: NTIS HC A02/MF A01

Two diets were compared in a cross-over design. The diets were designed as identical, isonitrogenous, four-week menu cycles. In the soy diet about 25% of the conventional protein products were replaced by soy protein materials, mostly concentrates. Normal eating and living patterns were maintained in both groups. Nutritional, medical, and toxicological experts of the laboratories involved came to the unanimous conclusion that no essential changes in physiological parameters had been observed between the two diets. Therefore, properly heat-treated soy protein materials are not expected to pose health problems. Author (ESA)

N79-26778# Mitre Corp., McLean, Va. Metrek Div.
TELEHEALTH HANDBOOK: A GUIDE TO TELECOMMUNICATIONS TECHNOLOGY FOR RURAL HEALTH CARE Final Report, 29 Jun. 1974 - 30 Sep. 1977
Arthur M. Bennett and Wanda H. Rappaport May 1978 164 p refs
(Contract PHS-HRA-106-74-182)
(PB-292557/6; MTR-7581; DHEW/PUB/PHS-79/3210; NCHSR-79-1) Avail: NTIS HC A08/MF A01 CSCL 06E

Telehealth is a term applied to the use of telecommunications technology to facilitate the delivery of health care and services among remotely located, geographically dispersed, or physically confined persons. With emphasis on primary care, this Handbook focused on the role of telecommunications technology in the exchange of patient, educational, and administrative information within a dispersed health care system. Although the emphasis was on planning for rural communities, where there is a severe shortage of health services, the resources, concepts and issues were applicable to urban areas also. GRA

N79-26779# Office of Radiation Programs, Silver Spring, Md.
RADIOFREQUENCY RADIATION LEVELS AND POPULATION EXPOSURE IN URBAN AREAS OF THE EASTERN UNITED STATES
D. L. Lambdin, R. A. Tell, N. N. Hankin, D. L. Lambdin, E. D. Mantiply, and D. E. Janes May 1978 52 p refs
(PB-292855/4; EPA-520/2-77-008) Avail: NTIS HC A04/MF A01 CSCL 06R

This report describes the measurement system, presents a summary of the environmental measurements, and gives one method of predicting population exposure from the environmental measurements. Environmental data were collected with a van mounted system consisting of antennas, a spectrum analyzer, and a minicomputer. Measurements were made in seven frequency bands between 0.01 and 900 MHz in which pilot studies had indicated that the most significant environmental exposures occur. Environmental data were collected at 193 sites in the seven cities. Values of power density integrated over the frequency range from 55 to 900 MHz generally fall into the range 0.001 and 1.0 microwatt per square centimeter with a median site value of about 0.01 microwatt per square centimeter. A model was developed which can be used to extrapolate the measured data to other points within the seven cities. Estimates of population exposure were obtained by combining this model with an automated population data base. GRA

N79-26780# Aerojet Liquid Rocket Co., Sacramento, Calif.
DEVELOPMENT OF AN ELECTRICAL ENERGY CONVERTER FOR DRIVING LEFT HEART ASSIST BLOOD PUMPS Annual Report, Oct. 1977 - Jun. 1978
K. C. Butler, W. Carriker, J. Dever, J. W. Hellwig, J. C. Hoffman, P. Meridith, J. Moise, and T. J. Uhrhammer 15 Jun. 1979 60 p
(Contract N01-HV-7-2971)
(PB-293510/4; NIH-N01-HV-7-2971-1; Rept-9290-1-79) Avail: NTIS HC A04/MF A01 CSCL 06L

The development of an electrical energy converter for incorporation in a left heart assist system suitable for human use is described. The converter utilizes hydraulic actuation and control with fluid supplied by an electric motor driver pump. The approach features modular components which can be packaged in the most appropriate manner for anatomic fit with a given blood pump and implant location. The converter is hermetically sealed and compatible with the body fluid environment. At this time component design and fabrication are complete with in vitro testing underway on most components. GRA

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N79-26781*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECTS OF NOISE FREQUENCY ON PERFORMANCE AND

ANNOYANCE M.S. Thesis - Georgia Inst. of Tech.
Kelli F. Key Jun. 1979 22 p refs Presented at 97th Meeting of the Acoust. Soc. of Am., Cambridge, Mass., 11-15 Jun. 1979
(NASA-TM-80107) Avail: NTIS HC A02/MF A01 CSCL 06S

Using a complex psychomotor task performed for 50 minutes in the presence of low frequency noise, high frequency noise, or ambient noise, annoyance ratings were obtained for noises of various frequencies by the method of magnitude estimation. The results suggest that high frequency noise affects female performance to a greater extent than male performance. Contrasted to these performance effects, the sexes did not differ in their annoyance ratings. A monotonically increasing relationship between annoyance and noise frequency was found (except for a decrease in annoyance at 8,000 Hz). It is concluded that both performance and annoyance responses may need to be assessed in certain situations to adequately describe human reaction to noise. R.E.S.

N79-26782*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
EFFECT OF HELICOPTER NOISE ON PASSENGER ANNOYANCE
Sherman A. Clevenson and Jack D. Leatherwood Jun. 1979 18 p refs Presented at 97th Meeting of the Acoust. Soc. of Am., Cambridge, Mass., 11-15 Jun. 1979
(NASA-TM-80106) Avail: NTIS HC A02/MF A01 CSCL 06S

The effects of helicopter interior noise on passenger annoyance for both reverie and listening situations was investigated. The relative effectiveness of several metrics for quantifying annoyance response for these situations was also studied. The noise stimuli were based upon recordings of the interior noise of civil helicopter research aircraft. These noises were presented at levels ranging from approximately 70 to 86 d with various tonal components selectively attenuated to give a range of spectra. The listening task required the subjects to listen to and record phonetically-balanced words presented within the various noise environments. Results indicate that annoyance during a listening condition is generally higher than annoyance under a reverie condition for corresponding interior noise environments. Attenuation of the tonal components results in increases in listening performance but has only a small effect upon annoyance for a given noise level. R.E.S.

N79-26783# Air Force Human Resources Lab., Brooks AFB, Tex.
AIR FORCE FEMALE PILOTS PROGRAM: INITIAL PERFORMANCE AND ATTITUDES Interim Report, Jul. 1976 - Jul. 1978
Jeffrey E. Kantor, Bart E. Noble, Sandra A. Leisey, and Terry McFarlane Feb. 1979 40 p refs
(AD-A065641; AFHRL-TR-78-67) Avail: NTIS HC A03/MF A01 CSCL 05/9

Following the 1975 decision to open Air Force pilot training to qualified officers of both sexes, research was undertaken (a) to establish a data base, from female pilot selectees, composed of pre-training measures found to be predictive of training performance for men, (b) to compare these data with those previously obtained from male pilot selectees for overall performance and predictive efficiency, and (c) to monitor the flying performance of women as judged by themselves, their instructors, and their supervisors in comparison with official Air Force flight standards and relative male performance. It should be noted that the results, presently available, are preliminary and reflect only the initial summary of findings from a continuing research project. Few significant differences were found between men and women entering pilot training. Comparable performance on most pre-training measures, combined with equivalent graduation rates, factors associated with flight training performance, and student impressions of the flight training experience, all lend strong support to the conclusion that men and women behave similarly in flight training. However, instructor ratings of male and female student characteristics did reveal several areas in which males were rated significantly better. The factors underlying these differential ratings were not discernible from the available data. Overall, the similarities between the sexes greatly outweighed the differences, indicating that coeducational pilot training can be accomplished without significant modification to the training system or resultant change in student attrition rate. Author (GRA)

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing.

N79-26784# Civil Aeromedical Inst., Oklahoma City, Okla.
THE OPTICAL PROPERTIES OF SMOKE-PROTECTIVE DEVICES
John A. Vaughan, Kenneth W. Welsh, and Paul G. Rasmussen Oct. 1978 20 p refs
(FAA-AM-78-41) Avail: NTIS HC A02/MF A01

The devices tested comprised eight goggles and five fullface oxygen masks (three rigid one-piece masks and two flexible hoods). Those properties evaluated were: (1) light transmission, (2) optical haze, (3) prismatic deviation, (4) refractive power, (5) optical distortion, and (6) surface curvature. All clear transparencies met or exceeded standards for light transmission, and all but one (an experimental hood) met the standards for optical haze. All but two of 11 devices exceeded standards for spherical refractive power. Three fullface masks and two goggles with steep surface curvatures did not meet the optical requirements for prismatic deviation. Only four of 11 devices evaluated by a photographic method attained the standard for optical distortion; however, when the criterion of visible distortion was employed, as outlined in the military specification, nine of the 11 devices conformed to the standard. Optical anomalies may be caused by facepiece configuration and surface curvature found in some of the smoke-protective devices. Author

N79-26785*# SRI International Corp., Menlo Park, Calif. Artificial Intelligence Center.
STUDY OF MODELING AND EVALUATION OF REMOTE MANIPULATION TASKS WITH FORCE FEEDBACK Final Report
John W. Hill Mar. 1979 40 p refs Prepared for JPL
(Contracts NAS7-100; JPL-955170; SRI Proj. 7696)
(NASA-CR-158721) Avail: NTIS HC A03/MF A01 CSCL 05H

The use of time and motion study methods to evaluate force feedback in remote manipulation tasks are described. Several systems of time measurement derived for industrial workers were studied and adapted for manipulator use. A task board incorporating a set of basic motions was designed and built. Results obtained from two subjects in three manipulation situations for each are reported: a force-reflective manipulator, a unilateral manipulator, and the unaided human hand. The results indicate that: (1) a time-and-motion study techniques are applicable to manipulation; and that (2) force feedback facilitates some motions (notably fitting), but not others (such as positioning). G.Y.

N79-26786# Human Engineering Labs., Aberdeen Proving Ground, Md.
A PHOTOMETRIC AND LEGIBILITY ASSESSMENT OF AEROSPACE OPTICS, INCORPORATED VIVISUN 20/20 DISPLAY Final Report
Harry R. Stowell and Alan M. Poston Jan. 1979 15 p refs
(AD-A067668; HEL-TN-2-79) Avail: NTIS HC A02/MF A01 CSCL 05/5

An evaluation was conducted on an annunciator display designed to be readable in direct sunlight. The color of the luminous legend was aviation red. The type of display evaluated is currently being used in commercial and military aircraft. Photometric and spectroradiometric measurements were taken in dark ambient lighting and in solar ambient lighting (direct sunlight) conditions. The red luminous legend was confortably readable in direct sunlight even though the luminance contrast was below the 50 percent recommended by MIL-STD-1472B. GRA

N79-26787# Forschungsinstitut fuer Anthropotechnik, Meckenheim (West Germany).
ANALYTICAL METHODS FOR BIOTECHNOLOGICAL DESIGN OF MAN MACHINE SYSTEMS: WORK ON SYSTEM ERGONOMY [ANALYTYSCHE VERFAHREN ZUR ERGONOMISCHEN GESTALTUNG VON MENSCH-MACHINE SYSTEMEN. EIN BEITRAG ZUR SYSTEMERGONOMIE]
B. Doering Feb. 1977 87 p refs In GERMAN; ENGLISH summary
(FB-28) Avail: NTIS HC A05/MF A01; Forschungsinst. fuer Antropotech., Meckenheim, West Ger. DM 10

In modern man-machine-systems personnel are confronted with complex task situations which have to be considered in the arrangement of man-machine-interfaces to avoid overloading of personnel during system operation. For this, considerations criteria and data do not yet exist. Methods are described which are applied in various system development phases to match the dynamic behavior of personnel and technical system components. Starting with system requirements derived from the mission, functions which are the basis for the selection of components were determined and analyzed. By the analysis of personnel functions data for task evaluation, man-machine-interface arrangement and workplace layout were obtained. Problems of system test and evaluation are discussed. Author (ESA)

55 PLANETARY BIOLOGY

Includes exobiology and extraterrestrial life.

No abstracts in this category.

59 MATHEMATICAL AND COMPUTER SCIENCES (GENERAL)

No abstracts in this category.

60 COMPUTER OPERATIONS AND HARDWARE

Includes computer graphics and data processing.
For components see *33 Electronics and Electrical Engineering.*

N79-26788 Illinois Univ. at Urbana-Champaign.
INTELLIGENT MAGNETIC BUBBLE MEMORIES Ph.D. Thesis
Mario Jino 1979 154 p
Avail: Univ. Microfilms Order No. 7913502

Ways of incorporating the novel bubble chip organizations and bubble movement operations in the design of magnetic bubble memories are examined. In particular, the performance of various file processing algorithms and memory organizations which can be achieved through their use is evaluated. Retrieval times per word and per page are the parameters used to evaluate the different memory organizations. Performance of hierarchical memory systems using bubble memories is discussed. The unique features of magnetic bubble memories are used in designing algorithms for elementary file processing operations such as sorting, merging, and clustering and for basic relational algebraic operations. Dissert. Abstr.

N79-26789 California Univ., Davis.
PERFORMANCE PREDICTION OF COMPUTER ARCHITECTURES OPERATING ON LINEAR MATHEMATICAL MODELS Ph.D. Thesis
Lyle Ashton Cox, Jr. 1978 216 p
Avail: Univ. Microfilms Order No. 7912954

The performance of the Petri-Net control system model is discussed in the light of the requirements for a computer architectural design tool. A number of examples are given to demonstrate the inherent correctness of accuracy. A large scale computer system design example is presented where this model is used to predict performance. The questions of ease of use, efficiency and accuracy are discussed, and the problems in the use of this type of approach for predicting performance of software-hardware ensembles are examined. Dissert. Abstr.

N79-26790 Auburn Univ., Ala.
FAULT SIMULATION, ANALYSIS AND DIAGNOSIS OF A MICROPROCESSOR Ph.D. Thesis
Marvin Cletus Schiffman 1979 161 p
Avail: Univ. Microfilms Order No. 7913689

A significant problem facing system designers and reliability analysts is the limited amount of data available on the microprocessor IC chips which are playing major roles in many critical applications. A concise analysis procedure for a microprocessor is developed at the register and functional unit levels for learning how the microprocessor operates and determining its critical sections. Based on the results of the analysis procedure two fault diagnostic methods are developed. These methods permit the system user to write fault detection programs to determine if the microprocessor is fault-free, or to write fault diagnostic test programs for detecting and locating a fault. To further aid in the analysis of a microprocessor a survey of simulation approaches was made. Dissert. Abstr.

N79-26791# North Dakota Univ., Grand Forks. Dept. of Electrical Engineering.
A STUDY OF THE CONSTRUCTION OF A DISTRIBUTIVE PROCESSING SYSTEM USING STANDARD COMPONENTS M.S. Thesis
Joel G. Altman Dec. 1977 60 p refs
Avail: NTIS HC A04/MF A01 CSCL 09B

A system which uses a large group of microprocessors to form a highly reliable computational machine was developed. The system was simulated on a digital computer in order to demonstrate the system's performance. S.E.S.

N79-26792# University of Southern California, Marina del Rey. Information Sciences Inst.
A RESEARCH PROGRAM IN COMPUTER TECHNOLOGY Annual Technical Report, 1 Jul. 1977 - 30 Sep. 1978
Keith W. Uncapher Feb. 1979 167 p refs
(Contract DAHC15-72-C-0308; ARPA Order 2223)
(AD-A067123; ISI/SR-79-14) Avail: NTIS HC A08/MF A01 CSCL 09/2

This program is aimed at applying computer science and technology to areas of high DoD/military impact. Research areas include: Specification Acquisition from Experts--study of acquiring and using program knowledge for making informal program specifications more precise; Military Message Experiment--development of an experimental user-oriented message service for potential large-scale military use; Program Verification--logical proof of program validity; Network Secure Communication--work on low-bandwidth, secure voice transmission using an asynchronous packet-switched network; Command and Control Graphics--development of a device-independent graphic system and graphics-oriented command and control applications programs; Autopsy--research program on source-to-source program translation combining automatic techniques with an interactive system to provide the human manager complete control over the translation process; Programming Research--development of a major time-shared microprogramming facility with an extension for emulation of microprocessors; Protection Analysis--methods of assessing the viability of security mechanisms of operating systems; Distributed Sensor Networks--developing algorithms and communication protocols to support the operation of geographically distributed sensors; and Internetwork Concepts--exploring aspects of protocols for the interconnection of computer communication networks, specifically the design and prototype

implementation of an internetwork computer message system and the design of internetwork host and gateway protocols.GRA

N79-26793# Naval Ocean Systems Center, San Diego, Calif.
DIRECT EXECUTION LANGUAGE ARCHITECTURE FOR SIMULATION Interim Report, Oct. 1977 - Sep. 1978
R. Martinez 15 Jan. 1979 34 p refs
(AD-A067824; NOSC/TR-367) Avail: NTIS HC A03/MF A01 CSCL 09/2

The study presented in this report addresses the application of direct execution computer architecture concepts using low-cost, large-scale-integration (LSI) to continuous system simulation. Basic architecture schemes for direct execution systems were investigated and applied to a demonstration interactive simulation language. A dual processor direct execution system was designed and built using an LSI-11 microcomputer, a 16K x 16 dual port memory, a microprogrammed AMD 2900 bit-slice direct execution processor, and a 16 x 16 multiplier chip. The system features a distinct separation of interpretive/compiler software and simulation run execution firmware linked via the dual port. The system is demonstrated via several simulation examples including realtime control, optimization, and torpedo dynamics problems. Author (GRA)

N79-26794# Arizona Univ., Tucson. Dept. of Chemistry.
CONVERS: AN INTERPRETIVE COMPILER
Scott B. Tilden and M. Bonner Denton 4 Apr. 1979 14 p refs
(Contract N00014-75-C-0573)
(AD-A067746; TR-19) Avail: NTIS HC A02/MF A01 CSCL 09/2

CONVERS, a new software package based on an 'interpretive compiler' concept, is described which provides a means of rapidly and efficiently developing customized software for any individual application. Numerous advantages are realized compared to other approaches, including high speed operation, superior memory efficiency, stack manipulation and a variety of high level constructs, etc. The unique concepts employed are contrasted with more conventional approaches. Author (GRA)

N79-26795# Research Triangle Inst., Research Triangle Park, N. C. Systems and Measurements Div.
A PRELIMINARY STUDY OF BUILT-IN-TEST FOR THE MILITARY COMPUTER FAMILY (MCF) Final Report, 14 Feb. - 16 Oct. 1978
Dan Wiorek, J. B. Clary, Atul Jai, Scott Weikel, Richard Soeks, and Dan Siewiorek Mar. 1979 204 p refs
(Contract DAAG29-76-D-0100)
(AD-A067744; CORADCOM-76-0100-F; RTI/1600/00-05F) Avail: NTIS HC A10/MF A01 CSCL 09/2

This study has addressed the use of built-in-test (BIT) for fault detection, isolation, and repair in the Military Computer Family (MCF). Particular emphasis was given to the identification and assessment of BIT techniques applicable to the MCF-AN/UYK-41(V). The MCF-AN/UYK-41(V) is software compatible with Digital Equipment Corporation's PDP-11/70. The approach taken in this study was to assume a fault population, predict where in the system these faults are most likely to occur and develop a rationale for deploying built-in fault detection and localization resources accordingly. The fault population assumed included both stuck-at and transient faults. It was determined using a failure prediction program based on MIL-HDBK-217B that for related computers, it is likely that 60% of all faults will occur in memory, 30% will be in the CPU and the remainder will happen throughout the rest of the computer including the power supply. GRA

N79-26796# Naval Ocean Systems Center, San Diego, Calif.
COMMERCIAL DIGITAL/ADP EQUIPMENT IN AN OCEAN ENVIRONMENT. VOLUME 1: PERFORMANCE STUDY Final Report, Jul. - Nov. 1978
J. G. Kammerer 15 Dec. 1978 32 p refs
(AD-A067662; NOSC/TD-228-Vol-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

The study reflected by this document surveyed the extent to which commercial automatic data processing (ADP) equipment is used in the ocean environment. The range of such applications and their relative success are surveyed, to assist in further decisions on such equipment in Operational Readiness Monitoring System (ORMS) uses. This document is provided in two volumes. Volume One is the narrative overview of the study. It covers study methodology, ORMS background, study findings, conclusions and recommendations. Volume Two is a collection of user documents in appendix form. These user appendices are reproduced as provided by the various commercial ADP equipment users and present detailed descriptions of equipment applications. Author (GRA)

N79-26797# Royal Aircraft Establishment, Farnborough (England).
A MICROPROCESSOR SEQUENCER FOR THE UK T5 ION THRUSTER AND POWER CONDITIONER UNIT
R. C. Hughes and J. A. Williams May 1978 26 p refs
(RAE-TR-78057; BR64928) Avail: NTIS HC A03/MF A01

A project is described, in which a previously existing hard-wired logic sequencer for the UK T5 10cm diameter ion thruster was replaced by a sequence generated by an Intel 8080A microprocessor. Details of the system are given together with background information relating to sequence requirements that arise from the thruster electrical power needs. Electrical features of the ion thruster are described where relevant to the switch-on procedure. A logical extension to the use of microprocessors in the ion thruster power conditioner context is also proposed. Such use would realize much more fully the potential of these devices and would result in a reduction of the mass and volume of the power conditioner and increase its reliability. Author (ESA)

N79-26798# Royal Aircraft Establishment, Farnborough (England). Instrumentation and Trials Dept.
THE MICROPROCESSOR AND ITS APPLICATION IN A LABORATORY ENVIRONMENT
M. Sockett (Univ. of Surrey, Engl.) 26 Aug. 1977 47 p
(RAE-TM-IT-165; BR59769) Avail: NTIS HC A03/MF A01

The experience gained in the selection and application of a microprocessor is reported. Observations are included about microprocessors generally, with particular emphasis on eight-bit machines. The Intel 8080A device and the Intel SDK-80 Evaluation Kit are considered in detail. Author (ESA)

N79-26799# National Bureau of Standards, Washington, D. C. Inst. for Computer Sciences and Technology.
COMPUTER SCIENCES AND TECHNOLOGY: COMPUTER PERIPHERAL MEMORY SYSTEM FORECAST Final Report
Robert B. J. Warnar, Peter J. Calomeris, and Steve A. Recicar Apr. 1979 153 p refs
(PB-294148/2; NBS-SP-500-45; LC-79-600036) Avail: NTIS HC A08/MF A01 CSCL 09B

Computer peripheral memory technologies as displayed by U.S. research and manufacturing facilities are described. Specifically, both technical and economic criteria are discussed. The presented peripheral memories include contemporary and emerging systems, all of which are compared in graphs, tables, and decision trees. An extensive bibliography (in ANSI format) to support certain main points that are supplemented by information supplied by the Institute for Computer Sciences and Technology (ICST) resources is presented. GRA

N79-26800# Office of Management and Budget, Washington, D. C.
INFORMATION TECHNOLOGY AND GOVERNMENTAL REORGANIZATION: SUMMARY OF THE FEDERAL DATA PROCESSING REORGANIZATION PROJECT Final Report
Alton P. Jensen, E. L. Dreeman, and Blasdel A. Reardon Apr. 1979 89 p
(PB-294543/4) Avail: NTIS HC A05/MF A01 CSCL 09B

The Federal Data Processing Reorganization Project was intitiated to examine the ways in which the Federal Government acquires, manages and uses data processing tehcnology, and to make recommendations that will help the Government (1) improve the delivery of services through the effective application of computer and related telecommunications technology; (2) improve the application and management of the relevant resources; (3) eliminate duplication and overlap to agency jurisdiction relative to computer issues; and (4) improve the productivity of the Federal data processing work force. The work was carried out through ten independent study teams: Human

Resources Team, National Security Team, Small Users Team, General Government Team, Science and Technology Team, Acquisition Team, Operational Management Team, Standards Team, Personnel Team, and the Central Agencies Team. The findings, conclusions, and recommendations of the ten team reports are summarized. GRA

61 COMPUTER PROGRAMMING AND SOFTWARE

Includes computer programs, routines, and algorithms.

N79-26801 Carnegie-Mellon Univ., Pittsburgh, Pa.
THE IMPLEMENTATION AND EVALUATION OF PARALLEL ALGORITHMS ON C.mmp Ph.D. Thesis
Peter Neil Oleinick 1979 104 p
Avail: Univ. Microfilms Order No. 7911932

The effects that synchronization can have on the performance of a parallel algorithm were examined. Several alternative synchronization primitives were studied. For each, the speed in performing the basic semaphore operations as well as the effect on the performance of the rootfinding algorithm were measured. The type of semaphore primitive selected to perform the synchronization of the rootfinding processes drastically affected the performance of the algorithm. A threshold for the practical application of each semaphore was determined from the measurements of the rootfinding algorithm. This insight into the C.mmp environment was applied toward the speech recognition system. The final implementation was compared to a version of the algorithm developed for a DEC PDP-KL10 uniprocessor. At maximum parallelism, eight processes, the C.mmp implementation performed the speech recognition task 30% faster than the uniprocessor. Dissert. Abstr.

N79-26802 New York Univ., N. Y.
AUTOMATIC DATA STRUCTURE CHOICE IN SETL Ph.D. Thesis
Ssu-cheng Liu 1978 271 p
Avail: Univ. Microfilms Order No. 7912287

Efficient data structuring of a SETL program is obtained by supplying to the language processor detailed descriptions of structural relations among program variables. These descriptions center around the concept of basings. Basing declarations are used to find efficient data layouts for the abstract structures of SETL. A design for a demonstration system constructed within this framework is described. The manner in which such a system would apply to typical examples is illustrated. A SETL specification of the proposed automatic data structure choice scheme is presented. Dissert. Abstr.

N79-26803 Rensselaer Polytechnic Inst., Troy, N. Y.
FACTORS AFFECTING THE USEFULNESS OF FLOW CHARTS AND OTHER FORMATS FOR COMPUTER PROGRAMS Ph.D. Thesis
Naomi Ann Kleid 1978 333 p
Avail: Univ. Microfilms Order No. 7913077

A theoretical model incorporating factors from information theory, communication theory, and expectancy theory is presented. Within the framework of the model, three formats for computer programs: ANSI flowcharts, Nassi-Shneiderman structured flowcharts, and structured program listings are compared in terms of their ability to facilitate the analysis of programmed procedures. A methodology for measuring the amount of entropy and potential information load in the formats is presented and used as the basis for the program analysis performance predictions. Nonformat specific hypotheses are tested using data from 46 programming students, and the specific, format related performance predictions are evaluated using data from these same students. Support is cited for several general hypotheses and for the format-complexity measurement methodology. Dissert. Abstr.

N79-26804 Illinois Univ. at Urbana-Champaign.
AN IMPLEMENTATION OF A SYSTEM FOR THE FORMAL DEFINITION OF PROGRAMMING LANGUAGES Ph.D. Thesis
Brian Alfred Hansche 1978 124 p
Avail: Univ. Microfilms Order No. 7913479

A method is described for generating a table driven interpreter for a programming language from a formal specification of its syntax and semantics. Such interpreters are useful in verifying the correctness of formal specifications, and in providing experience with initial versions of experimental languages. Existing formal specification methods are discussed and one method, based on a string replacement mechanism, is selected as the basis for implementing a table driven interpreter. A class of machines called Parse Tree Automata is defined. These machines are such that each state can be represented as a parse tree of a concrete program. An interpreter is then defined by a computation sequence of the Parse Tree Automaton. A method of constructing a table driven interpreter based on these abstract machines is given and algorithms for reducing the number of transitions needed by the interpreter are supplied. Dissert. Abstr.

N79-26805 Illinois Univ. at Urbana-Champaign.
SENSITIVITY ANALYSIS FOR HEURISTIC ALGORITHMS Ph.D. Thesis
Donald Kent Friesen 1978 181 p
Avail: Univ. Microfilms Order No. 7913460

The concept of sensitivity analysis is applied to near optimal solutions. In particular approximate solutions to bin packing, multiprocessor scheduling, and knapsack problems are examined, analyzing the effect of varying certain parameters of the problems on the approximation algorithms. For the bin packing problems, the effect of varying the size of the bin is analyzed and asymptotic bounds on the worst case behavior of the first fit and first fit decreasing algorithms are obtained as a function of the size of the bin. Multiprocessor scheduling when the jobs are not independent is also studied, and the effect of changing the execution times of jobs or the precedence relation is examined. The problem of determining when the greedy solution is in fact optimal is studied under the assumption that the size of the knapsack is assumed to lie in an interval instead of having a specified value. Dissert. Abstr.

N79-26806 Carnegie-Mellon Univ., Pittsburgh, Pa.
AUTOMATICALLY DECOMPOSING SIGNAL PROCESSING APPLICATIONS ON MULTIPROCESSORS Ph.D. Thesis
William Cain Brantley, Jr. 1979 141 p
Avail: Univ. Microfilms Order No. 7911922

The signal processing application is represented by its data flow graph, DFG. Two multiprocessor architectures are studied: global and local memory architectures. For both architectures, contention is ignored. Approximate algorithms are proposed to decompose a DFG for a local memory architecture. The new algorithms are inspired by the approximate bin-packing algorithms used for the other architecture. In addition, one algorithm from cluster analysis is proposed. The algorithms are evaluated empirically on both DFGs from passive sonar signal processing and random DFGs. Algorithms which are more concerned with arcs than nodes are found to use fewer partitions on average. Dissert. Abstr.

N79-26807 Stanford Univ., Calif.
A FRAMEWORK FOR PROBLEM-SOLVING IN A DISTRIBUTED PROCESSING ENVIRONMENT Ph.D. Thesis
Reid Garfield Smith 1979 234 p
Avail: Univ. Microfilms Order No. 7912412

The concept of the cooperative solution of problems by a decentralized and loosely-coupled collection of knowledge sources that operates in a distributed processor architecture is presented. Such architectures offer high speed, reliable computation at low cost and are an effective way to utilize the new LSI processors and the developments of the recent synthesis of computer and communications technology. The types of knowledge used in such a problem solver are discussed, together with the ways that the knowledge is indexed within an individual node and distributed among the collection of nodes. The use of two primary types of knowledge (referred to as task centered and knowledge source centered) is shown. Dissert. Abstr.

N79-26808 Utah Univ., Salt Lake City.
A HIERARCHICAL MODEL OF PORTABLE INPUT/OUTPUT Ph.D. Thesis

Bruce Edward Wampler 1979 270 p
Avail: Univ. Microfilms Order No. 7914085

The design and implementation of a highly portable hierarchical I/O package for small computers is discussed. The I/O package is based on a hierarchical I/O model that includes a comprehensive set of operations applicable to a broad class of I/O problems. The model defines the interrelationships among the operations, and suggests techniques that may be used to implement the hierarchy in a portable fashion. A portable programming language, LS2, was developed and used as an implementation tool to write a specific version of the I/O package. A portable compiler for LS2 which allows LS2 to be implemented for a new computer in less than a week is described. Dissert. Abstr.

N79-26809 Illinois Univ. at Urbana-Champaign.
A MULTIPROCESSING SYSTEM FOR THE DIRECT EXECUTION OF LISP Ph.D. Thesis
Rhon Linn Williams 1978 77 p
Avail: Univ. Microfilms Order No. 7913656

Current implementations were found to be impractical for airborne use due to LISP's incompatibility with conventional computer architectures. Direct execution of LISP with tasks distributed between three processors, seemed to be a workable solution. The language was analyzed and a special token was devised using a descriptor with a single pointer. Through careful distribution of responsibilities, control and data flow between the processors was minimized. Significant memory savings resulted from ASCII storage and real time garbage collection. A simulation was used to help estimate execution times and showed a factor of 50 to 100 increase in speed. The direct execution of LISP by a multiprocessing system, computer aided decision making could be implemented to enhance the safety of flight operations. Dissert. Abstr.

N79-26810*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TRENDS IN RELIABILITY MODELING TECHNOLOGY FOR FAULT TOLERANT SYSTEMS
Salvatore J. Bavuso Apr 1979 15 p refs
(NASA-TM-80089) Avail: NTIS HC A02/MF A01 CSCL 09B

Reliability modeling for fault tolerant avionic computing systems was developed. The modeling of large systems involving issues of state size and complexity, fault coverage, and practical computation was discussed. A novel technique which provides the tool for studying the reliability of systems with nonconstant failure rates is presented. The fault latency which may provide a method of obtaining vital latent fault data is measured. S.E.S.

N79-26811*# California Univ., Los Angeles.
NEWSUMT: A FORTRAN PROGRAM FOR INEQUALITY CONSTRAINED FUNCTION MINIMIZATION, USERS GUIDE
Hirokazu Miura and Lucien A. Schmit, Jr. Jun. 1979 47 p refs
(Grant NGR-05-007-337)
(NASA-CR-159070) Avail: NTIS HC A03/MF A01 CSCL 09B

A computer program written in FORTRAN subroutine form for the solution of linear and nonlinear constrained and unconstrained function minimization problems is presented. The algorithm is the sequence of unconstrained minimizations using the Newton's method for unconstrained function minimizations. The use of NEWSUMT and the definition of all parameters are described. M.M.M.

N79-26812# Pennsylvania Univ., Philadelphia. Dept. of Decision Sciences.
FQL A FUNCTIONAL QUERY LANGUAGE Technical Report, Apr. 1978 - Mar. 1979
O. Peter Buneman and Robert E. Frankel Mar. 1979 28 p refs
(NR Proj. 049-272)
(AD-A066992; Rept-79-03-05) Avail: NTIS HC A03/MF A01 CSCL 09/2

An applicative language based upon recent ideas by John Backus has been developed. The language provides a powerful formalism for the expression of complex database queries. Though currently implemented with an interface to a CODASYL system, the language employs a sufficiently general data model that use with other database management systems is possible. This paper describes the language through a number of examples and outlines its implementation. Author (GRA)

N79-26813# Naval Surface Weapons Center, Dahlgren, Va.
AN AUTOMATED SOFTWARE MAINTENANCE TOOL FOR LARGE-SCALE OPERATING SYSTEMS Final Report
Alan L. Zirkle Dec. 1978 32 p refs
(AD-A067799; NSWC/DR-TR-3936) Avail: NTIS HC A03/MF A01 CSCL 09/2

A method for automating many of the tasks involved in maintaining a large computer operating system (SCOPE 3.4 on the CDC 6700) is described. The method is embodied in several procedures, each of which aids in one phase of operating system maintenance. These procedures are written in a manner that promotes ease of modification or enhancement. This automated maintenance tool can also be used in other programming applications where a large amount of effort must be expended in noncreative housekeeping tasks. Author (GRA)

N79-26814# Naval Surface Weapons Center, Dahlgren, Va.
DEVELOPMENT OF MATHEMATICAL SOFTWARE AND MATHEMATICAL SOFTWARE LIBRARIES
Alfred H. Morris, Jr. Apr. 1979 31 p refs
(AD-A068023; NSWC/DL-TR-79-102) Avail: NTIS HC A03/MF A01 CSCL 09/2

The purpose of this paper is to briefly examine several of the major issues concerning the development of numerical mathematical software and numerical mathematical software libraries. The paper begins with a brief summary of the evolution of general-purpose mathematical software libraries. This is followed by an introductory discussion on software reliability. It is often tacitly assumed that most of the basic numerical mathematics problems have satisfactorily been solved. This is shown not to be the case. Indeed, it is noted that many of the problems encounter not only deep theoretical difficulties, but also numerous software engineering problems. The next major topic is software portability. Here the emphasis is on portability difficulties that arise from design deficiencies in the programming languages. It is noted that FORTRAN permits an arithmetic expression to be altered when it is known that the modification can produce different results. The final issues considered are those involved in forming a library. If the purpose of the library is to serve as broad an audience as possible, then it is recognized that the subroutines in the library should be as simple to use and as comprehensive as is practical. Thus formation of the library can be characterized as a packaging problem, the objective being to package mathematical formulae and theory into comprehensive, simple-to-use subroutines. Author (GRA)

N79-26815# Puk (Richard F.), Albuquerque, N. Mex.
HOST-COMPUTER IMPLEMENTATION GUIDELINES FOR THE THREE-DIMENSIONAL GRAPHICS COMPATIBILITY SYSTEM (GCS) Final Report
Richard F. Puk Mar. 1979 37 p refs
(Contract DACA39-78-M-0053)
(AD-A067976; WES-MP-0-79-1) Avail: NTIS HC A03/MF A01 CSCL 09/2

This report gives guidelines for implementing the Graphics Compatibility System (GCS) on a host-computer system. The following areas are discussed: (1) Graphics Status Area (GSA) values; (2) Functional specifications for each of the three-dimensional (3D) GCS computer-dependent routines; (3) Factors involved in supporting 3D GCS on a computer system; and (4) Phased sequence for implementing 3D GCS on a new computer system. Author (GRA)

N79-26816# Naval Weapons Center, China Lake, Calif.
NAVY LABORATORY INTERACTIVE GRAPHICS STUDY Final Report, FY 1978
Dale Oliver Christensen Mar. 1979 45 p
(AD-A067402; NWC-TP-6083) Avail: NTIS HC A03/MF A01 CSCL 09/2

The objective of the Navy Laboratory Interactive Graphics Study (NLIGS) was to define the interactive graphics needs of the Navy laboratories in the present and in the future. In this

study, interactive graphics refers to the minicomputer-based turnkey interactive graphics systems (MTIGSs). The seven Navy laboratories formally requested a total of 110 work stations under NLIGS. The application areas are documentation and drafting, mechanical design and layout, integrated circuit design, design and fabrication of printed circuit boards, and tape preparation for numerical control machines. The recommendations of the NLIGS are that $10M in funds be identified over a 2-fiscal-year period to procure a Navy laboratory MTIGS, that a support organization be established to increase overall system productivity, that a productive study be initiated to develop the methods of monitoring system productivity, that each Navy laboratory submit an interactive graphics implementation plan, and that a national graphics information interchange standard be pursued. Author (GRA)

N79-26817# Illinois Univ., Urbana. Dept. of Computer Science.

SOFTWARE SYSTEMS RESEARCH Report, 16 Nov. 1977 - 15 Nov. 1978

1978 23 p refs

(Contract EY-76-S-02-2383)

(COO-2383-51) Avail: NTIS HC A02/MF A01

Highlights of the work include the refinement of the Model Analysis Package (MAP) into production form, completion of work on a practical scheme for integrating a large class of nonlinear oscillatory problems, and the introduction of the UNIX operating system onto the Interdate 7/32 computer. Simulation system development, theory and related program development, and software and hardware system development are discussed. DOE

N79-26818# Hanford Engineering Development Lab., Richland, Wash.

VARIED APPLICATIONS OF A NEW MAXIMUM-LIKELIHOOD CODE WITH COMPLETE COVARIANCE CAPABILITY

F. Schmittroth 1978 18 p refs Presented at Workshop on Theory and Appl. of Sensitivity and Uncertainty Analysis, Oak Ridge, Tenn., 22-24 Aug. 1978

(Contract EY-76-C-14-2170)

(HEDL-SA-1616-FP; Conf-780858-9) Avail: NTIS HC A02/MF A01

Applications of a new data-adjustment code are given. The method was based on a maximum-likelihood extension of generalized least squares methods that allowed complete covariance descriptions for the input data and the final adjusted data evaluations. The maximum-likelihood approach was used with a generalized log-normal distribution that provided a way to treat problems with large uncertainties and that circumvents the problem of negative values that can occur for physically positive quantities. The computer code, FERRET, was written to enable the user to apply it to a large variety of problems by modifying only the input subroutine. The following applications are discussed: A 75-group a priori damage function was adjusted by as much as a factor of two by use of 14 integral measurements in different reactor spectra. Reactor spectra and dosimeter cross sections were simultaneously adjusted on the basis of both integral measurements and experimental proton-recall spectra. DOE

N79-26819# Fondazione Ugo Bordoni, Rome (Italy).

SIMULATION OF AN INFORMATION SYSTEM WITH A DISTRIBUTED ARCHITECTURE [SIMULAZIONE DI UN SISTEMA INFORMATIVO CON ARCHITETTURA DISTRIBUITA]

Alessandro Perugia Dec. 1977 18 p refs In ITALIAN

(FUB-34-1977) Avail: NTIS HC A02/MF A01

A simulation program of a traffic model for a databank real time information system is described. Simulation is shown to be useful for optimizing the structure and dimensioning the system. The chosen closed network system, although adequate for verifying utilization of available resources and for identifying bottlenecks, is not ideal for evaluating the quality of service at the outlet for which average time of response could not be determined. The simulation was done on a Univac 1106 computer and required about one minute calculation time with a confidence interval of 10 percent. Calculation time is not dependent on the number of front-ends and back-ends in the model. Author (ESA)

N79-26820# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.

THE DESIGN AND IMPLEMENTATION OF SOFTWARE FOR UNCONSTRAINED OPTIMIZATION

Philip E. Gill and Walter Murray Oct. 1978 64 p refs Presented at NATO Advanced Study Inst. on the Design and Implementation of Optimization Software, SOGESTA, Urbino, Italy, 20 Jun.-2 Jul. 1977

(NPL-DNACS-8/78) Avail: NTIS HC A04/MF A01

The design of computer software for the unconstrained minimization problem P1 minimize F(x), where F(x) is a twice-continuously differentiable function of n variables x = (x1, x2,..., xn)exp T, is examined. The mathematical software available to solve this kind of problem is generally in one of two forms. There are self-contained programs for solving a single problem category. These are often used to test the features of new optimization methods. The second form available consists of part of a collection of routines, known as a program library, which are conceived and written within a unified framework to be accessible to a general community of users. It is primarily this second type of software which is discussed and as a consequence theoretical methods are sought which, while catering for the different categories, nevertheless involve the same basic operations of the optimization process. Author (ESA)

N79-26821# Fondazione Ugo Bordoni, Rome (Italy).

THE USE OF SIMULATION LANGUAGES FOR STUDYING DIGITAL DIRECT CONTROL SYSTEMS [SULL USO DEI LINGUAGGI DI SIMULAZIONE PER LO STUDIO DEI SISTEMI DI CONTROLLO DIGITALE DIRETTO]

Michele LaCava (Univ. della Calabria) and Salvatore Nicosia (Rome Univ.) Feb. 1978 24 p refs In ITALIAN

(FUB-5-1978) Avail: NTIS HC A02/MF A01

The solving, by computer programs using known languages, of differential equations for continuous systems operating with DDC (Digital Direct Control) was studied. The languages S/260 CSMP, MIMIC, and CSSL3 were considered. Programs were prepared using all three languages for the DDC case and also extended to the case of a regulator with several inlets and outlets. Results are satisfactory in all cases. Examples are shown. Author (ESA)

N79-26822# National Institutes of Health, Bethesda, Md.

A PRIMER FOR MLAB: AN ON-LINE MODELLING LABORATORY

Emile Tobenfeld and John McCann Nov. 1978 116 p refs

(PB-292895/0; NIH/DF-79/001A) Avail: NTIS HC A06/MF A01 CSCL 09B

MLAB was developed as a tool for experimentation with, and evaluation of, mathematical models or functions. Its power and flexibility allow it to be used cost effectively for a wide spectrum of mathematical problems ranging from elementary arithmetic operations, systems of linear and nonlinear equations, differential equations, and, in particular, curve fitting and graphics. Sophisticated operations are accomplished on-line by issuing a few relatively simple commands, and since results are available immediately to the user, he can update his model and proceed to the next operation based on the results he has received. GRA

N79-26823# Research Inst. of National Defence, Stockholm (Sweden).

ALGORITHMS NEEDED IN A NATURAL LANGUAGE UNDERSTANDING SYSTEM

Jacob Palme Feb. 1979 31 p refs

(PB-293232/5; FOA-C-10077-M3(E5)) Avail: NTIS HC A03/MF A01 CSCL 05G

Rules about how certain words or word combinations are to be interpreted in a computerized natural language understanding system are presented. GRA

N79-27066# Joint Publications Research Service, Arlington, Va.

PRINCIPLES OF THE CONSTRUCTION OF A NEW GENERATION OF SAPR'S

L. A. Rychkov and B. A. Kuzmin *In its* Transl. on USSR Sci.

and Technol.: Phys. Sci. and Technol., No. 72 (JPRS-73663) 12 Jun. 1979 p 13-24 refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 1, Jan. 1979 p 4-7 (For primary document see N79-27064 17-99)
Avail: NTIS HC A05/MF A01

62 COMPUTER SYSTEMS

Includes computer networks.

N79-26824 Stanford Univ., Calif.
PRODUCT DIFFERENTIATION IN COMPUTER SERVICES Ph.D. Thesis
Michal Gartenkraut 1979 173 p
Avail: Univ. Microfilms Order No. 7912362

Two equilibria are studied: the user equilibrium and the market equilibrium. A user equilibrium is obtained if, for a given fixed set of prices, no user has an incentive to change his choice of center or of quantity of service purchased. A method for determining user's choice in equilibrium is presented for the case where all services are (partial) substitutes. The solution method permits the study of the influence several factors have on user's choice. A method of solving the conditions for a market equilibrium is presented which enables one to analyze service survival and diversity, and the factors affecting them.
Dissert. Abstr.

N79-26825# Royal Signals and Radar Establishment, Malvern (England).
PLANNING AND CONTROL OF SOFTWARE BASED SYSTEMS
K. Jackson May 1978 5 p refs
(RSRE-78012; BR65548) Avail: NTIS HC A02/MF A01

A Defence Scientific Advisory Council committee studied the problems associated with the development and maintenance of software based computer systems. It identifies the nature of the problems in this area, makes some comments on these problems and puts forward eight recommendations which it is suggested could alleviate many of the problems. Author (ESA)

63 CYBERNETICS

Includes feedback and control theory.
For related information see also *54 Man/System Technology and Life Support.*

N79-26826 University of Western Michigan, Kalamazoo.
MARKOVIAN MULTISERVER QUEUEING SYSTEMS WITH SERVERS IN SERIES Ph.D. Thesis
Nancy Jean Boynton 1979 141 p
Avail: Univ. Microfilms Order No. 7913673

Queues with the servers in series are examined. Customers must pass through each server station but are served by only one. This introduces the possibility of blocking. Customers are served on a first-come-first-served basis. Arrivals are assumed to form a Poisson stream with mean arrival rate gamma. Each server is assumed to have a negative exponential service time distribution with the same service rate mu. First, the queue with two servers in series is examined. The values of rho, the ratio of the input rate to the total output rate for which the system is positive recurrent, recurrent null, and transient are determined. A number of formulas and numerical examples of this system are examined. The system is then generalized to a system with k waiting spaces between the two servers. A customer may move into a waiting space after completing service while waiting to leave the system. Dissert. Abstr.

N79-26827 Illinois Univ. at Urbana-Champaign.
ADAPTIVE ALLOCATION OF DECISION MAKING RESPONSIBILITY BETWEEN HUMAN AND COMPUTER IN MULTI-TASK SITUATIONS Ph.D. Thesis
Yee-yeen Chu 1978 147 p
Avail: Univ. Microfilms Order No. 7913409

A queueing theory formulation of multitask decision making is used to develop a procedure for determining when the computer should be assigned decision making responsibility. A threshold policy for turning computer on/off according to the weighted number of events present in the system is proposed. An experimental representation of a computer aided multitask flight management situation was developed. A computer aiding program was implemented. Results compared quite favorably with those from a computer simulation which employed a queueing model. The queueing model appears to be adequate to represent the multitask decision making situation, and to be capable of predicting the system performance such as delay time and server occupancy. This simple measure of server occupancy was found to highly correlate with the subjective effort ratings. The model has the potential for predicting human workload in multitask situations. Dissert. Abstr.

N79-26828# Air Force Avionics Lab., Wright-Patterson AFB, Ohio.
OPTIMAL FEEDBACK CONTROLS FOR PARAMETER IDENTIFICATION Ph.D. Thesis - AF Inst. of Techno. Final Report
David N. Olmstead Feb. 1979 177 p refs
(AD-A067265; AFAL-TR-79-1022) Avail: NTIS HC A09/MF A01 CSCL 12/1

This dissertation investigates improving the estimates of unknown constant parameters in the plant and control matrices of a linear discrete system from noisy measurements by the use of a control consisting of a feedback term and open-loop term. The feedback term allows one to move the poles of the system to a location which improves the information in the output about the parameters beyond that attainable with only open-loop control inputs. An energy constraint is placed on the open-loop term of the control and the closed-loop poles are required to remain within a predetermined constraint space. Output feedback is used and for the cases where the dimension of the output is less than the dimension of the system states, an additional consistency constraint on the closed-loop poles is required. The criterion that has been used is the maximization of the trace or weighted trace of the Fisher information matrix. A gradient projection algorithm has been developed that maximizes this scalar function while maintaining the poles within the constraint space. This procedure results in maximizing the sum of a maximum eigenvalue of a positive semi-definite matrix and a term resulting from the feedback of measurement noise into the process equations. The variable in this maximizaton procedure is the feedback matrix. The optimal open-loop control sequence is a scaled eigenvector corresponding to the maximum eigenvalue. The procedure is developed for the multiple parameter and multiple input control cases. Examples are used to demonstrate the enhancement of parameter identification gained by adding feedback control to an open-loop control input.
Author (GRA)

N79-26829# Rome Air Development Center, Griffiss AFB, N.Y.
MODEM IDENTIFICATION EXPERIMENTS Progress Report, Jan. - Aug. 1978
Jorge A. Fernandez Feb. 1979 81 p
(AF Proj. 4519)
(AD-A067538; RADC-TR-79-55) Avail: NTIS HC A05/MF A01 CSCL 09/2

This report describes the design and evaluation of classifiers for distinguishing four types of modems: the CODEX LXI-9600, the HUGHES HC-276, the PARADYNE LSI-96, and LENKURT 26-C. The data used to develop these classifiers consisted of many digitized time sample waveforms for each modem and was collected by RADC's Digital Communication Experimental Facility (DICEF). With the Waveform Processing System (WPS) capabilities, the Interactive Processing Section of the Information Sciences Division (ISCP) analyzed this waveform data and extracted an initial set of eighty features. This initial set was later modified to fifty features. The On-Line Pattern Analysis and Recognition System (OLPARS) was then used to develop a number of classifier designs which are based on different subsets of the initial fifty features. Author (GRA)

N79-26830# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.

STOCHASTIC AND ADAPTIVE SYSTEMS Final Report, 1 Feb. 1978 - 31 Jan. 1979
Michael Athans and Sanjoy K. Mitter Mar. 1979 23 p refs
(Grant AF-AFOSR-3281-77; AF Proj. 2304)
(AD-A067598; LIDS-FR-895; AFOSR-79-0445TR) Avail: NTIS HC A02/MF A01 CSCL 09/2

This research is concerned with various aspects of stochastic and adaptive systems. Topics covered include: non-linear filtering, stochastic control, reliable and robust control system design and implementation of control laws by finite-state sequential machines. Author (GRA)

N79-26831# Yale Univ., New Haven, Conn. Systems and Information Sciences.
STABLE DISCRETE ADAPTIVE CONTROL
Kumpati S. Narendra and Yuan-Hao Lin Mar. 1979 24 p refs
(Contract N00014-76-C-0017)
(AD-A067812; S/IS-7901) Avail: NTIS HC A02/MF A01 CSCL 12/1

This paper examines the discrete version of the problem recapitulating the basic philosophy as well as the specific technique used for the design of the adaptive controller. The first few sections of this paper have been considerably condensed and the interested reader is referred to the earlier work for all details. The principal contribution made here is the verification of the conjecture regarding the stability of the adaptive loop, for the discrete problem. Accordingly most of the paper is devoted to the proof of stability. These results together with some recent work done on the stability of differential equations with unbounded coefficients may prove helpful in resolving the stability problem of continuous adaptive systems as well. GRA

N79-26832# Royal Aircraft Establishment, Farnborough (England).
NOTE ON A TIME DEPENDENT QUEUE M/D/1 WITH INPUT EQUAL TO SERVICE RATE
D. E. Lloyd London Sep. 1978 18 p refs
(RAE-TM-MATH-COMP-7807; BR65357) Avail: NTIS HC A02/MF A01

Time-dependent behavior of a single-server queue with Poisson input and constant service time, where the input rate equals the reciprocal of the service time are considered. Formula for the probabilities associated with different queue-lengths are derived by an empirical method which include inspection of some numerical results. These formula are proved correct by induction. Author (ESA)

N79-26833# Oxford Univ. (England). Dept. of Engineering Sciences.
ON THE STABILITY AND CONVERGENCE OF SELF-TUNING ALGORITHMS
P. J. Gawthrop 1978 46 p refs
(OUEL-1259/78) Avail: NTIS HC A03/MF A01

The behavior of a computationaly simple adaptive control algorithm, a so-called self-tuning regulator, was studied as a system in a stochastic setting. it is demonstrated that the analysis of a model-reference algorithm can be adapted to give results on the convergence of self-tuning algorithms. For systems with either unit delay or 'white noise' models, a number of self tuning algorithms can be written in the form of a feedback system. Analysis shows the feedback system to be well-posed, and so input-output stability of the self-tuning algorithms can be deduced. Given the stability results, the convergence (with probability one) of the mean-square output error is to zero. Author (ESA)

64 NUMERICAL ANALYSIS

Includes iteration, difference equations, and numerical approximation.

N79-26834 California Univ., Irvine.
CONTACT SPACES FOR SINGULARITIES OVER PERFECT FIELDS Ph.D. Thesis
Terry James Brennan 1979 75 p
Avail: Univ. Microfilms Order No. 7913951

The methods presented involve studying the differential structure of the ideal of S sub x(X) and essentially showing (and this holds over any field) that the strict transform of a Hasse derivative is in the ideal of Hasse derivatives of the strict transform. The existence of Artinian contact in general is proven and the Artinian contact spaces for complete intersections which are images in certain flat families of normally flat sections of deformations of the singularity are constructed. Dissert. Abstr.

N79-26835 Carnegie-Mellon Univ., Pittsburgh, Pa.
THE ELASTIC-PLASTIC DANGLING SPIDER PROBLEM Ph.D. Thesis
Jack Lee Buhite 1978 67 p
Avail: Univ. Microfilms Order No. 7911923

The existence of solutions to the equations governing the motion of an elastic plastic dynamic oscillator by using the recent theory of differential equations with discontinuous right hand side which is due to FILIPPOV, and by direct approximation techniques are presented. Uniqueness of solutions, continuous dependence of solutions on the initial data and on the applied force, and various stability results are shown to follow considerations of the energy in the system. The motion of the system under periodic loading is considered. The influence of the periodic solutions on the stability of the oscillator are discussed.
Dissert. Abstr.

N79-26836 Florida Univ., Gainesville.
THE PRIME DISCRIMINANT FACTORIZATION OF DISCRIMINANTS OF ALGEBRAIC NUMBER FIELDS Ph.D. Thesis
Danny Nevin Davis 1978 69 p
Avail: Univ. Microfilms Order No. 7913263

Several generalizations on the factoring of quadratic discriminants as a product of prime quadratic discriminants are discussed. Dissert. Abstr.

N79-26837 Boston Univ., Mass.
A PERTURBATION METHOD FOR THE PERIODIC SOLUTIONS OF A DISCONTINUOUS SYSTEM OF DIFFERENTIAL EQUATIONS Ph.D. Thesis
John David Rush 1979 161 p
Avail: Univ. Microfilms Order No. 7912160

Two sets of determining equations and Fredholm Alternatives are derived which guarantee the existence of a unique periodic continuous solution of the switching problem. One set is based on the hypothesis that the solution of the reduced system is continuously differentiable across the switching times. The other set is vaid for the two dimensional case. Several two dimensional examples are physically discussed and analyzed using the methods described. Dissert. Abstr.

N79-26838 Illinois Univ. at Urbana-Champaign, Urbana.
PROXIMITY AND REACHABILITY IN THE PLANE Ph.D. Thesis
Der-Tsai Lee 1978 157 p
Avail: Univ. Microfilms Order No. 7913526

The Voronoi diagram for a set of N points in the Cartesian plane in which the L sub p-metric is the distance measure is defined and an algorithm for constructing the diagram in O(N log N) time is presented. The problem of triangulating a set of points in the plane as well as the shortest path problem with constraints is discussed. Dissert. Abstr.

N79-26839 Houston Univ., Tex.
AN APPROACH TO BIASED ESTIMATION IN REGRESSION ANALYSIS Ph.D. Thesis
Nelson Eduardo Marquina 1978 136 p
Avail: Univ. Microfilms Order No. 7912828

Results associated with biased estimation procedures, in particular, directed ridge regression and latent root regression are presented. A procedure is proposed that takes into account the negative effects of the multicollinearity problem. This procedure combined the ability of detecting nonpredictive multicollinearities by latent root regression with the improved estimation procedure of the directed ridge regression. Dissert. Abstr.

N79-26840 Georgia Univ., Athens.
A STUDY OF THE EFFECTS OF ERROR OF MEASUREMENT

ON MULTIPLE REGRESSION ANALYSIS AND A COMPARISON OF POSSIBLE CORRECTION TECHNIQUES Ph.D. Thesis
Valton Harry Markos 1978 90 p
Avail: Univ. Microfilms Order No. 7914042

A thorough review of the literature pertaining to measurement error in multiple regression analysis is presented. A Monte Carlo study of several methods of estimating true multiple correlation and regression coefficients from data inaccurately measured is described and results reported. Results demonstrated the relative accuracy of the Fuller approach in estimating regression coefficients, while the modified Bock technique was quite disappointing in its accuracy. In the estimation of the multiple correlation, none of the techniques appeared to be sufficiently accurate to warrant recommendation. Comparisons were also made on the hypothesis testing of the multiple correlation coefficients. Conclusions are drawn and implications discussed. Dissert. Abstr.

N79-26841 Oklahoma State Univ., Stillwater.
COMPUTATIONAL EXPERIMENTS WITH SYSTEMS OF NONLINEAR EQUATIONS Ph.D. Thesis
Guang-Nay Wang 1978 133 p
Avail: Univ. Microfilms Order No. 7912656

Research based on the Gay-Schnabel proposal which is a modification of Broyden's method for solving systems of nonlinear equations is presented. Gay and Schnabel use the orthogonal projection of the current step onto the orthogonal complement of some or all of the previous steps to generate a new step. The features and convergence properties of this algorithm and its extensions are discussed and its performance compared with that of some other algorithms such as Broyden's method, Brown's method, and the DFP method. Thirteen different problems and thirty-three different cases were tested for twelve different algorithms. Dissert. Abstr.

N79-26842 Illinois Univ. at Urbana-Champaign, Urbana.
IDENTIFICATION OF PARAMETERS IN DISTRIBUTED SYSTEMS USING FINITE ELEMENT METHOD Ph.D. Thesis
Hasan Sahitoglu 1978 89 p
Avail: Univ. Microfilms Order No. 7913607

A method for the identification of parameters in distributed systems governed by parabolic and hyperbolic partial differential equations is presented. The method uses finite element approach to reduce the system's governing equation into a set of ordinary differential equations. A suitable performance index is minimized by using a gradient method. Measurement of the field variable at a small number of points in the solution domain is required. Time derivatives of the field variable, whenever necessary, are estimated by using a derivative filter technique. The method is used either online or offline for identification purposes. Examples presented include the application of the method to wave and diffusion equations having linear and nonlinear parameters. A radial flow problem with a boundary condition is considered. Dissert. Abstr.

N79-26843# Yale Univ., New Haven, Conn. Dept. of Engineering and Applied Science.
LEARNING AUTOMATA: A CRITIQUE
Kumpati S. Narendra and S. Lakshmivarahan May 1977 26 p refs
(Grant NSF 08616)
(S/IS-7703) Avail: NTIS HC A03/MF A01

An update is given from research studies on variable structure automata with passing reference to fixed structure schemes. Definitions and concepts are explained as well as an analysis of the fixed and variable structure schemes which are based on the theory of Markov chains and Markov Processes. Recent developments in areas of learning automata theory are presented. M.M.M.

N79-26844*# Massachusetts Inst. of Tech., Cambridge. Lab. for Information and Decision Systems.
LINEAR STATE FEEDBACK, QUADRATIC WEIGHTS, AND CLOSED LOOP EIGENSTRUCTURES M.S. Thesis
Peter Murray Thompson Jun. 1979 101 p refs
(Grant NsG-1553)
(NASA-CR-158755; LIDS-TH-916) Avail: NTIS HC A06/MF A01 CSCL 12A

Results are given on the relationships between closed loop eigenstructures, state feedback gain matrices of the linear state feedback problem, and quadratic weights of the linear quadratic regulator. Equations are derived for the angles of general multivariable root loci and linear quadratic optimal root loci, including angles of departure and approach. The generalized eigenvalue problem is used for the first time to compute angles of approach. Equations are also derived to find the sensitivity of closed loop eigenvalues and the directional derivatives of closed loop eigenvectors (with respect to a scalar multiplying the feedback gain matrix or the quadratic control weight). An equivalence class of quadratic weights that produce the same asymptotic eigenstructure is defined, sufficient conditions to be in it are given, a canonical element is defined, and an algorithm to find it is given. The behavior of the optimal root locus in the nonasymptotic region is shown to be different for quadratic weights with the same asymptotic properties. A.R.H.

N79-26845# Ohio State Univ., Columbus. Dept. of Statistics.
APPROXIMATE TESTS OF HYPOTHESES IN REGRESSION MODELS WITH GROUPED DATA Interim Report
Abhaya Indrayan and Jagdish Rustagi, S. Feb. 1979 22 p refs Prepared in cooperation with Gorakhpur Univ., India
(Contract N00014-78-C-0543)
(AD-A068926; TR-172) Avail: NTIS HC A02/MF A01 CSCL 12/1

Techniques for testing hypotheses about parameters in the regression models under the situation of grouped data are provided. A test statistic similar to conventional F statistic is considered. A simulation study performed for a few cases shows that the proposed statistic has an approximate F distribution and is useful in applications. Author (GRA)

N79-26846# Yale Univ., New Haven, Conn. Dept. of Computer Science.
SPLINE REGRESSION ALGORITHMS AND LOCAL DEPENDENCE Ph.D. Thesis
John Winslow Lewis Dec. 1978 94 p refs
(Contract N00014-76-C-0277; Grant NSF MCS-76-11460)
(AD-A067248; RR-148) Avail: NTIS HC A05/MF A01 CSCL 12/1

Curve fitting has been an important problem in data analysis and curve design for many years. Spline regression is a relatively new mathematical curve fitting method which has proved to be useful for moderately accurate (2 to 5 decimal digit) approximations to data which are difficult to approximate by analytic means. The qualitative behavior of least-squares spline approximations differs significantly from that of most classical approximation schemes in that least-squares splines are highly local. While the value of a polynomial (or any other analytic function) at a point can be determined from its value and derivatives at any arbitrarily distant point, the value of the least-squares spline at any point is almost completely determined by neighboring data. In this dissertation, a detailed analysis of algorithms for computing and evaluating least-squares spline approximations to data is presented. The algorithms are given explicitly in an ALGOL-like language and operation counts are presented. Of particular interest are a fast incremental algorithm for evaluating splines and a limited-storage algorithm for computing piecewise polynomial representations of splines. GRA

N79-26847# Illinois Univ. at Urbana-Champaign. Computer-Based Education Research Lab.
THE LEAST-SQUARES ESTIMATION OF LATENT TRAIT VARIABLES BY A HILBERT SPACE APPROACH Technical Report, 1 Oct. - 31 Dec. 1979
Kikumi Tatsuoka Jan. 1979 40 p refs
(Contract N00014-78-C-0159; RR0420401)
(AD-A067279; CERL-E-4; RR-1) Avail: NTIS HC A03/MF A01 CSCL 12/1

This research developed a new method for estimating a given latent trait variable Theta by the least-squares approach. The notion of multiple regression equation was reinterpreted in terms of properties of a Hilbert space and the calculation formula for beta weights that can be obtained recursively in the form of Fourier series was derived. The Theta values estimated by this

method and the maximum likelihood method were compared using live data. It was shown that Theta values estimated by the least-squares method was just as good as Theta by the maximum likelihood method. The advantage of using this method as against the traditional method is that values of Theta are always obtainable even for a small number of items. The maximum likelihood method, on the other hand, often fails to converge in such cases. Author (GRA)

N79-26848# Florida State Univ., Tallahassee. Dept. of Statistics.

TWO CONCEPTS OF POSITIVE DEPENDENCE, WITH APPLICATIONS IN MULTIVARIATE ANALYSIS Interim Report

Abdul-Hadi N. Ahmed, Naftali A. Langberg, Ramon V. Leon, and Frank Proschan Nov. 1978 40 p refs
(Grant AF-AFOSR-3678-78; AF Proj. 2304)
(AD-A067545; FSU-Statistics-M486; TR-78-6; AFOSR-79-0429TR) Avail: NTIS HC A03/MF A01 CSCL 12/1

We develop properties and theory for positive orthant dependence, a multivariate extension of Lehmann's positive quadrant dependence, and right tail increasing in sequence dependence, a multivariate extension of Esary and Proschan's bivariate right tail increasing dependence. Applications are then obtained in the form of inequalities and monotonicity in a wide variety of multivariate statistical problems, including MANOVA, contingency tables, dependence measurement, competing risk models, reliability of series systems, and distributions theory. Author (GRA)

N79-26849# Southern Methodist Univ., Dallas, Tex. Dept. of Operations Research and Engineering.

SPLITTING THE BUMP IN AN ELIMINATION FACTORIZATION Interim Report

R. V. Helgason and J. K. Kennington Mar. 1979 24 p refs
(Grant AF-AFOSR-3151-77; AF Proj. 2304)
(AD-A067712; OREM-79004; AFOSR-79-0446TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

This exposition presents a method for incorporating a technique known as splitting the bump within an elimination form reinversion algorithm. This procedure is designed to reduce fill-in during reinversion and should improve the efficiency of linear programming systems already use the superior elimination form of the inverse. Author (GRA)

N79-26850# Texas A&M Univ., College Station. Inst. of Statistics.

LEAST SQUARES PREDICTION FOR MIXED AUTOREGRESSIVE MOVING AVERAGE TIME SERIES

H. Joseph Newton and Marcello Pagano Feb. 1979 12 p
(Contract N00014-78-C-0599)
(AD-A067768; TR-N-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

A computer subroutine is given for computing predictors of any specified horizon's ahead. Author (GRA)

N79-26851# Yale Univ., New Haven, Conn. Systems and Information Sciences.

THE STABILITY OF SECOND ORDER QUADRATIC DIFFERENTIAL EQUATIONS, PART 2

Daniel E. Koditschek and Kumpati S. Narendra Dec. 1978 18 p refs
(Contract N00014-76-C-0017)
(AD-A067813; S/IS-7805-Pt-2) Avail: NTIS HC A02/MF A01 CSCL 12/1

This is a sequel to the earlier report on pure quadratic systems and considers the complexities introduced by the addition of a linear term. The diversity of qualitative behavior evinced by such systems has led us to limit this investigation to a specific question - global asymptotic stability. Necessary and sufficient conditions for such stability are derived here taking advantage of the relatively simple structure of the pure quadratic systems discussed. These conditions may find application in such areas of systems theory as adaptive control and bilinear systems. Author (GRA)

N79-26852# Texas Univ. at Austin. Dept. of Electrical Engineering.

A GENERAL MARTINGALE APPROACH TO DISCRETE TIME STOCHASTIC CONTROL AND ESTIMATION Interim Report

Kai Hsu and Steven I. Marcus 23 Mar. 1979 24 p refs Submitted for publication
(Contract F49620-77-C-0101; Grant AF-AFOSR-0025-79)
(AD-A067834; AFOSR-79-0453TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

A general method of constructing system models for the solution of discrete time stochastic control and estimation problems is presented. The method involves the application of modern martingale theory and entails the judicious choice of certain sigma-algebras and martingales. General estimation equations are derived for observations taking values in a countable space, and previously obtained estimation equations are exhibited as special cases. Finally, an example of the application of the these methods to a stochastic control problem is analyzed. Author (GRA)

N79-26853# Michigan Univ., Ann Arbor. Dept. of Mathematics.

CAPACITANCE MATRIX METHODS FOR THE HELMHOLTZ EQUATION ON GENERAL THREE-DIMENSIONAL REGIONS

D. P. OLeary and Olof Widlund (New York Univ., N. Y.) Oct. 1978 97 p refs
(Contract EY-76-C-02-3077; Grant NSF MCS-76-06595)
(COO-3077-155) Avail: NTIS HC A05/MF A01

The method for the Helmholtz equation extended to three-dimensional problems is presented. After a review of classical potential theory, the capacitance matrix methods are derived. Then the algorithmic aspects of importance for developing fast, reliable computer codes are examined; conjugate gradient methods and the use of spectral information and approximate inverses of the capacitance matrices are considered. The fast Poisson solver used is described. The computer code developed is discussed and a listing is given. DOE

N79-26854# Montpellier Univ. (France). Dept. of Physique Mathematique.

RELATIONSHIP BETWEEN DIRAC AND MATRIX SCHROEDINGER INVERSE SCATTERING TRANSFORMS

M. Jaulent and J. J. P. Leon Jun. 1978 7 p refs
(PM/78/6) Avail: NTIS HC A02/MF A01

A relationship between two applications of the inverse scattering method for solving nonlinear equations was established. The inverse method associated with the massive Dirac system (D) is derived from the inverse method associated with the 2 x 2 matrix Schroedinger equation (S). In these equations the parameter Q is subjected to a nonlinear constraint equivalent to a linear constraint on the reflection coefficient for (S). Author (ESA)

N79-26855# Helsinki Univ. of Technology, Espoo (Finland). Inst. of Mathematics.

ON THE EXISTENCE OF SOLUTIONS OF NONLINEAR VOLTERRA EQUATIONS IN ABSTRACT SPACES Ph.D. Thesis

Gustave Gripenberg 1978 11 p refs
(HTKK-Mat-A120/1978; ISBN-951-751-243-0) Avail: NTIS HC A02/MF A01

Only the existence of solutions for certain nonlinear Volterra integral equations, or variations and extensions thereon, is shown. A specific equation was considered in Hilbert space. The method followed was to construct a sequence of solutions of some appropriate equations that are somehow similar to the equation cited. It is then shown that these solutions satisfy some apriori bounds. Finally, it is shown that these solutions converge to a solution of the introductory equation. Author (ESA)

N79-26856# Florence Univ. (Italy). Facolta d'Ingeniera.

LANDESMAN-LAZAR TYPE PROBLEMS FOR NONLINEAR EQUATIONS

Jean Mawhin 23 Apr. 1977 25 p refs Presented at Ist. di Mat. Appl., Florence, 7 Mar. 1977

Avail: NTIS HC A02/MF A01

It is shown how a quite general continuation theorem allows unification and simplification of recent results in the area of finding sufficient conditions for the solvability of nonlinear equations for abstract problems of the Landesman-Lazar type. One of the abstract results is applied to the study of periodic solutions of ordinary differential equations with one-sided growth restrictions. Sharp sufficient conditions for the existence of periodic solutions, which are 'almost' necessary, in the sense of Landesman-Lazar's pioneering work in partial differential equations are obtained for some subclasses of equations. A bibliography about Landesman-Lazar type problems is also included.
Author (ESA)

N79-26857# Florence Univ. (Italy). Facolta d'Ingeniera.
ON THE BOUNDARY VALUE PROBLEM u SECOND DERIVATIVE + u = 1/ALPHA u + p(t) u(0) = 0 = n (pi)
Klaus Schmitt 7 Mar. 1977 9 p refs Presented at Ist. de Mat. Appl., Florence, 7 Mar. 1977
Avail: NTIS HC A02/MF A01

The boundary value problem u second derivative + u = 1/alpha u + p(t), u(0) = 0 = u(pi), where 1/u (t) = max braces 1/u(t),0 braces, alpha is a positive constant and pi brackets O, pi brackets tends to the limit R is a continuous function such that the integral from 0 to pi p(s) sinsds is < or = 0 is considered. A continuation theorem of Mawhin is stated and subsequently used to prove that the integral from 0 to pi p(s) sinsds is < or = 0 is a necessary and sufficient condition in order that the above cited boundary problem has a solution for any alpha > 0.
Author (ESA)

N79-26858# Fondazione Ugo Bordoni, Rome (Italy).
FUNCTIONS OF A PARTICULAR CLASS OF SINGULAR MATRICES [FUNZIONI DI UNA PARTICOLARE CLASSE DI MATRICI SINGOLARI]
Pietro Fillipponi May 1977 7 p refs In ITALIAN
(FUB-12-1977) Avail: NTIS HC A02/MF A01

A particular class of matrices is analyzed and a general expression for calculating any function of them is obtained. M are symmetric postive semidefinite matrices determined by two vectors of order n. The power functions, the exponential functions, and the trigonometric functions are given. A set of matrices that can be used to test general matrix functions in computer programs is derived.
Author (ESA)

N79-26859# Fondazione Ugo Bordoni, Rome (Italy).
CRITERIA FOR THE DIMENSIONING OF NUMERICAL MULTIPLEXING FRAMES [CRITERI PER IL DIMENSIONAMENTO DELLA TRAMA DEI MULTIPLEX NUMERICI]
Odoardo Brugia, Domenico DeSeta, Wolfgango Maggi, Claudio Rossi, and William Wolfowicz Jul. 1977 15 p refs In ITALIAN
(FUB-27-1977) Avail: NTIS HC A02/MF A01

Frame dimensioning and refraining characteristics selection criteria are discussed in reference to numerical asynchronous multiplexing on an order greater than one. A list of main objectives such as maximizing frame length to reframing word length ratio, putting a limit on the average frame slip frequency, and minimizing waiting time jitter is discussed. A list of dimensioning criteria is deduced and, in particular, the limiting ratio of frame length to reframing word length is shown in a chart as a function of a two parameters, h and delta, derived from initial data. Two examples of multiplexing dimensioning are given.
Author (ESA)

N79-26860# Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Computer Sciences.
AN ITERATIVE SOLVER FOR A MIXED VARIABLE VARIATIONAL FORMULATION OF THE (FIRST) BIHARMONIC PROBLEM
Owe Axelsson and Ivar Gustafsson 1978 17 p refs
(CTH-78.02-R) Avail: NTIS HC A02/MF A01

The coupled system of equations, resulting from a mixed variable formulation of the biharmonic problem, is solved by a preconditioned conjugate gradient method. The preconditioning matrix is based on an incomplete factorization of a positive definite operator similar to the thirteen point difference approximation of the biharmonic operator. Results show that the first iterate is already quite accurate even if the initial approximation is not so. Hence, often a small number of iterations will suffice to get an accurate enough solution. For smaller iteration errors, the number of iterations grows as O(h exp-1), h approaches 0, where h is an average meshsize parameter.
Author (ESA)

N79-26861# Chalmers Univ. of Technology, Goteborg (Sweden). Dept. of Computer Sciences.
CONJUGATE GRADIENT TYPE METHODS FOR UNSYMMETRIC AND INCONSISTENT SYSTEMS OF LINEAR EQUATIONS
Owe Axelsson 1978 31 p refs Submitted for publication
(CTH-78.03-R) Avail: NTIS HC A03/MF A01

For inconsistent problems a minimal residual conjugate gradient method, applied on AA(exp T)equivalent u = b, u = A(exp T)equivalent u is proven to converge. For unsymmetric problems, besides conjugate gradient methods on the normal equations, a (modified) minimal residual (least squares) method, which converges for systems with matrices that have a positive definite symmetric part is presented. Preconditioning and rate of convergence is also discussed.
Author (ESA)

N79-26862# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
THE LEAST SQUARES ADJUSTMENT OF ERRORS IN LEVEL SURVEYS
M. G. Cox Oct. 1978 23 p refs
(NPL-DNACS-9/78) Avail: NTIS HC A02/MF A01

A class of problems in surveying applications is considered which involves the least squares solution of large systems of over-determined linear equations. Direct and iterative solution techniques are discussed, as are the methods which work with the observation and normal matrices. Some related statistical considerations are also examined.
Author (ESA)

N79-26863# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
KRONECKER'S CANONICAL FORM AND THE QZ ALGORITHM
J. H. Wilkinson Nov. 1978 24 p refs
(NPL-DNACS-10/78) Avail: NTIS HC A02/MF A01

The generalized eigenvalue problem Au = lambda Bu is considered. The fact that if lambda and u are an eigenvalue and eigenvector of Au = lambda Bu then x = ue exp(lamdba t) is a solution of the homogeneous system Bds/dt = Ax is emphasized. The Kronecker canonical form is used to define the concept of equivalence studied. The QZ algorithm developed by Moler and Stewart is adopted as a method for dealing with the generalized eigenvalue problem. Results show the QZ algorithm gives exact eigenvalues and eigenvectors of matrices differing from A and B by perturbations of the order of magnitude of rounding errors. The properties of singular lambda matrices A-lambda B and their consequences for practical algorithms are also covered.
Author (ESA)

N79-26864# National Physical Lab., Teddington (England). Div. of Numerical Analysis and Computer Science.
NOTE ON THE PRACTICAL SIGNIFICANCE OF THE DRAZIN INVERSE
J. H. Wilkinson Dec. 1978 21 p refs
(NPL-DNACS-13/79) Avail: NTIS HC A02/MF A01

Practical algorithms for solving the differential system Bdx/dt = AX + f(t), where A and B are nxn matrices, or closely related algorithms, which provide effective methods for computing the Drazin inverse are investigated. An nxn matrix, A, is chosen where the Drazin inverse of A is the matrix X satisfying the relations AX = XA, XAX = X, and XAexp(k + 1) = A exp k, where k = Ind(A). Ind(A), the index of A, is the smallest non-negative interger for which rank (A exp k) = rank A exp(k + 1). The existence and uniqueness of A is proven. Algorithms are illustrated and results indicate significant reduction of effort over explicit computational techniques.
Author (ESA)

65 STATISTICS AND PROBABILITY

Includes data sampling and smoothing; Monte Carlo method; and stochastic processes.

N79-26865 Princeton Univ., N. J.
REDUNDANCY ANALYSIS AND ASSOCIATED ASYMPTOTIC DISTRIBUTION THEORY Ph.D. Thesis
David Edward Tyler 1979 122 p
Avail: Univ. Microfilms Order No. 7913999

The index of redundancy which has been receiving increasing attention in the fields of psychology and education, purports to measure the degree to which one random vector can predict another random vector, or equivalently, how redundant one random vector is relative to another random vector. Properties of the index of redundancy are reviewed, and a 'property' of the index which has appeared in the literature is shown to be false by means of a counterexample. A simultaneous decomposition of the random vectors, which differs from the standard canonical decomposition, is then derived and motivated. After motivating the redundancy decomposition, asymptotic distributions associated with the sample estimates of the eigenvalues and eigenvectors involved in the redundancy decomposition are derived. The asymptotic distribution of the sample index of redundancy is also derived. Dissert. Abstr.

N79-26866 Delaware Univ., Newark.
ON FRACTIONAL REPLICATION OF SYMMETRICAL FACTORIAL DESIGNS WHERE THE NUMBER OF LEVELS IS NOT NECESSARILY A PRIME OR POWER OF A PRIME Ph.D. Thesis
Wayne Stollard Copes 1978 215 p
Avail: Univ. Microfilms Order No. 7911315

Combinatorial mathematics is used to develop a method for constructing 1/2 fractions of the general K to the Nth power symmetric factorial experiment. The method does not require that K be either a prime or power of a prime. An examination of the structure of orthogonal polynomials is used to prove that the proposed method of fractionation partitions the treatment combinations of the experiment into two blocks which correspond to those formed when the least likely to be significant component of the N-factor interaction is confounded. A method based on orthogonal polynomials is given for analyzing these fractions. Questions regarding the augmentation required to obtain the balanced designs necessary for the analysis are answered. Dissert. Abstr.

N79-26867# Naval Ocean Systems Center, San Diego, Calif.
SPECTRAL ESTIMATION USING POISSON DISTRIBUTED TIME SERIES DATA WITH TIME QUANTIZATION Final Report, Oct. 1977 - Sep. 1978
C. Mirabile 15 Oct. 1978 45 p refs
(AD-A067324; NOSC/TR-325) Avail: NTIS HC A03/MF A01 CSCL 12/1

In this report spectral estimation, using Poisson distributed time samples which have been time quantized, is considered. An expression for the probability density function for the time quantized Poisson samples is derived. For a large class of nonbandlimited spectral density functions the bias of the spectral estimates is determined and an asymptotic bound on the variance is also derived. Numerical analysis of the bias and variance bound is performed and graphs of the bias as a function of frequency are presented. Finally, examples of spectral estimates are given with varying degress of time quantization. Results show small amount of bias introduced into estimates and variance remains almost unaffected. The chief advantage of Poisson sampling theory is that it eliminates spectral aliasing on nonbandlimited and undersampled time series data. Time quantized Poisson data results from sampling constraints due to hardware implementation. GRA

N79-26868# Florida State Univ., Tallahassee. Dept. of Statistics.
MINIMAX SUBSET SELECTION FOR THE MULTINOMIAL AND POISSON DISTRIBUTIONS
Roger L. Berger Feb. 1979 25 p refs
(Grant DAAG29-76-G-0238)
(AD-A067187; FSU-Statistics-M497; ARO-D33; ARO-13888.17-MX) Avail: NTIS HC A02/MF A01 CSCL 12/1

Let (X1, ..., Xk) be a multinomial vector with unknown cell probabilities (p1, ..., Pk). A subset of the cells is to be selected in a way so that the cell associated with the smallest cell probability is included in the selected subset with a preassigned probability, P^*. Suppose the loss is measured by the size of the selected subset, S. Using linear programming techniques, selection rules can be constructed which are minimax with respect to S in the class of rules which satisfy the P^*-condition. In some situations, the rule constructed by this method is the rule proposed by Nagel (1970). Similar techniques also work for selection in terms of the largest cell probability. The rules constructed in this fashion are also minimax for selection in terms of Poisson parameters. Author (GRA)

N79-26869# University of Southern California, Los Angeles.
THE ONE-ON-ONE STOCHASTIC DUEL, PARTS 1 AND 2 Interim Technical Report
C. J. Ancker, Jr. 15 Apr. 1979 104 p refs Presented at the Ann. ORSA Meeting, Washington, D.C., 11 May 1966
(Contract DAAG29-78-C-0012)
(AD-A068008; ISE-TR-79-1-Pt-1/2; ARO-15084.1-M) Avail: NTIS HC A06/MF A01 CSCL 12/1

This report is approximately one half of the output of a project to exhaustively review the literature of one-on-one stochastic duels. It contains two main parts. The first is an exposition, identifying and tying together for the first time, by examples, the two principal analytical techniques used, namely; mixture theory and renewal theory. Secondly, it contains an exhaustive, comprehensive, and fully annotated bibliography of all research results in this theory which are known to the author. Finally, it also lists many theorems involving characteristic functions which are particularly useful for this work. Author (GRA)

N79-26870# Texas Univ. at Austin. Dept. of Electrical Engineering.
ESTIMATOR PERFORMANCE FOR A CLASS OF NONLINEAR ESTIMATION PROBLEMS Interim Report
Chang-Huan Liu and Steven I. Marcus 23 Mar. 1979 25 p refs
(Contract F49620-77-C-0101; Grants AF-AFOSR-0025-79; NSF ENG-76-11106)
(AD-A067661; AFOSR-79-0454TR) Avail: NTIS HC A02/MF A01 CSCL 12/1

The state estimation problem for a certain class of nonlinear stochastic systems with white Gaussian plant and observation noise is considered. The optimal (minimum variance) estimators for these systems are recursive and finite dimensional. A particular nonlinear system which contains a polynomial nonlinearity is presented. Both optimal and suboptimal estimators and an estimation lower bound for such a system are derived. The performance of the optimal and suboptimal estimators and the lower bound are compared both analytically and by computer simulation. Author (GRA)

N79-26871# Royal Aircraft Establishment, Farnborough (England).
EXPANSIONS IN SERIES OF CHEBYSHEV POLYNOMIALS OF A FUNCTION OCCURING IN LINEAR UNSTEADY AERODYNAMIC THEORY
D. E. Davies London Jul. 1977 71 p refs
(RAE-TR-77110; BR77110) Avail: NTIS HC A04/MF A01

A procedure is described for obtaining an expansion in series of Chebyshev polynomials of the function: integral from 0 to infinity of (e exp -i alpha u))du/(u sq + w)exp(n + 1/2) for all real alpha and all integers n > or = 0. Numerical values are given for the coefficients of the series of Chebyshev polynomials obtained from a FORTRAN program. The leading coefficients are given to twelve significant figures. Author (ESA)

66 SYSTEMS ANALYSIS

Includes mathematical modeling; network analysis; and operations research.

N79-26872 State Univ. of New York at Buffalo.
A STATE SPACE APPROACH TO HIERARCHICAL SYSTEMS Ph.D. Thesis
Peter Periandros Groumpos 1979 189 p
Avail: Univ. Microfilms Order No. 7913890

The importance of dynamical hierarchical systems and state models for various hierarchical structures is discussed. The class of two-level dynamical hierarchical systems is considered. The arrow canonical form is defined and its properties are also discussed. The block arrow canonical form is associated with a two-level hierarchical structure. The problem of pole placement for a two-level dynamical hierarchical system, via state feedback, is analyzed and resolved. The complexity of the various subsystems that compose such a hierarchical structure is specified. The justification of the two-level dynamical hierarchical approach with some important results is presented. Dissert. Abstr.

N79-26873 Illinois Univ. at Urbana-Champaign, Urbana.
MULTIMODELING AND MULTIPARAMETER SINGULAR PERTURBATION IN CONTROL AND GAME THEORY Ph.D. Thesis
Hassan Kamal El-Din Khalil 1978 167 p
Avail: Univ. Microfilms Order No. 7913511

Singular perturbations are employed to capture the multi-model nature of interconnected systems with slow and fast modes. For multi-modeling problems single parameters are not sufficient and a vector singular perturbation problem is formulated. In particular, the uniform asymptotic stability, initial value problems and optimal control problems for multiparameter singularly perturbed systems are treated. A boundary layer system stability requirement is formulated and used to extend single parameters results to the multiparameter case. For systems with weak coupling between the fast parts a multimodel design methodology is proposed and used. The relationship between feedback information structures and well posedness in singularly perturbed strategies is addressed. Dissert. Abstr.

N79-26874 Illinois Univ. at Urbana-Champaign.
ESTIMATION FOR UNCERTAIN LINEAR SYSTEMS WITH JUMP PARAMETERS Ph.D. Thesis
Jitendra Kumar Tugnait 1978 138 p
Avail: Univ. Microfilms Order No. 7913645

The problem of state estimation for a class of linear discrete-time dynamical systems with unknown time-varying parameters is investigated. Attention is focused mainly on systems with unknown noise statistics. Two different approaches to modelling and estimation under time-varying uncertainties are investigated. In one of the approaches, a finite state Markov chain model is used for the jump parameters which can take values only from a finite set with transitions from one value to another determined by a Markov transition probability matrix. The transition matrix may or may not be known; if unknown, it is assumed to belong to a finite set. In the second approach, multiple bounds on the unknown parameter values and its time derivatives are assumed to be available. A detection-estimation approach is proposed for state estimation and its asymptotic behavior is analyzed. Dissert. Abstr.

N79-26875*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Engineering Science and Mechanics.
STUDY OF IMPROVED MODELING AND SOLUTION PROCEDURES FOR NONLINEAR ANALYSIS Final Report, 1 Jul. 1978 - 30 Jun. 1979
Manohar Kamat 4 Jul. 1979 124 p refs
(Grant NsG-1546)
(NASA-CR-158750) Avail: NTIS HC A06/MF A01 CSCL 12B

An evaluation of the ACTION computer code on an aircraft like structure is presented. This computer program proved adequate in predicting gross response parameters in structures which undergo severe localized cross sectional deformations. M.M.M.

67 THEORETICAL MATHEMATICS

Includes topology and number theory.

N79-26876 Illinois Univ. at Urbana-Champaign, Urbana.
BLOCH FUNCTIONS IN SEVERAL COMPLEX VARIABLES Ph.D. Thesis
Richard Martin Timoney 1978 160 p
Avail: Univ. Microfilms Order No. 7913638

Bloch functions on bounded symmetric domains in complex m-space are studied. The proofs rely on complex analysis, functional analysis, differential geometry and the theory of bounded symmetric domains. The differential geometry used arises in connection with the Bergman metric and the functional analysis needed includes facts from the isomorphic theory of Banach spaces and from the theory of topological tensor products of Banach spaces. Dissert. Abstr.

N79-26877 Washington Univ., Seattle.
SIMULTANEOUS QUANTUM MECHANICAL OBSERVATIONS AND NONLINEAR QUANTUM STOCHASTIC FILTER Ph.D. Thesis
Dragoslav Ilic 1978 162 p
Avail: Univ. Microfilms Order No. 7913347

Optimization with respect to an epsilon-algebra is introduced for the solution of quantum mechanical filtering problem. A nonclassical characteristic of this method is the optimal construction of the observation stochastic process. Using this approach, the optimal nonlinear quantum filter for a scalar valued stochastic process to be observed is obtained. An operator valued measure representing simultaneous quantum mechanical observation is proposed. The resulting joint probability distribution for incompatible quantum observables satisfies all requirements imposed by classical probability theory; this property is novel in the theory of quantum mechanics. Dissert. Abstr.

N79-26878 State Univ. of New York at Buffalo.
CONTRIBUTION TO THE THEORY OF (N,M)-COMPACT, PARACOMPACT AND NORMAL SPACES Ph.D. Thesis
Hasan Zare Hdeib 1979 114 p
Avail: Univ. Microfilms Order No. 7913891

Some aspects of the theory of (n,m)-compact, paracompact, and normal spaces are investigated. Notions of various types of mappings and spaces are defined and their properties studied. Generalizations of mappings, characterizations of m-paracompact and strongly m-paracompact spaces, relations between generalizations of the notion of compactness, and closure preserving families of a compact set are examined. Results are used to establish product theorems concerning paracompact spaces. A mapping which preserves the counter images of normal spaces is defined and some product theorems for normal spaces are obtained. Dissert. Abstr.

N79-26879 Massachusetts Univ., Amherst.
ON LINEAR DIFFERENTIAL SYSTEMS HAVING SEPARABLE EXPONENTIAL FORM SOLUTIONS WITH APPLICATION TO THE CALCULATION OF TRANSITION MATRICES Ph.D. Thesis
Michel Rene Froidevaux 1979 535 p
Avail: Univ. Microfilms Order No. 7912684

Systems for which the evaluation of matrix exponentials can be carried out explicitly using elementary functions and for which a mode separation may occur when the matrix exponential factors each relate to a different power of the parameter are discussed. Certain dynamical systems having a special structure often studied in the control literature are investigated and the resulting finite exponential product (FEP) approximations are displayed and evaluated with respect to accuracy and computational efficiency criteria. These results are later used in the complete treatment of a sixth-order problem of practical significance to the field of inertial navigation. For this example, it is shown, via numerical simulation, that a two rate integration method based on the FEP formulation provides a great computational saving to obtain a local solution as compared with integrating the complete system at the high rate with a standard integration routine.
Dissert. Abstr.

70 PHYSICS (GENERAL)

For geophysics see *46 Geophysics*. For astrophysics see *90 Astrophysics*. For solar physics see *92 Solar physics*.

N79-26880 Rensselaer Polytechnic Inst., Troy, N. Y.
NONLINEAR WAVES AS PARTICLES Ph.D. Thesis
William Clifford Fullin 1978 96 p
Avail: Univ. Microfilms Order No. 7913073

The use of particle-like solutions to nonlinear wave equations as model hadrons were investigated. These wave equations are considered as the equation of motion for a real, scalar field which is derivable from a Lorentz invariant Lagrangian density. Several fields and solutions to their corresponding equations of motion are examined at both the classical and quantum level. First order quantum corrections to the classical mass of these objects are computed in the weak coupling limit using functional integral methods. The fields considered are in one space and time dimension. A brief discussion of basic theory is presented and the sine-Gordon field is examined. Two additional fields are also examined. These are the lambda phi to the 3rd power field and a generalization of the sine-Gordon system. Dissert. Abstr.

71 ACOUSTICS

Includes sound generation, transmission and attenuation.

For noise pollution see *45 Environment Pollution*.

N79-26881*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
AN EVALUATION OF LINEAR ACOUSTIC THEORY FOR A HOVERING ROTOR
Charles E. K. Morris, Jr., F. Farassat (Joint Inst. for Advan. of Flight Sci.), and Paul A. Nystrom May 1979 57 p refs
(Grant NsG-1474)
(NASA-TM-80059) Avail: NTIS HC A04/MF A01 CSCL 20A

Linear acoustic calculations are compared with previously reported data for a small-scale hovering rotor operated at high tip Mach numbers. A detailed calculated description of the distributions of blade surface pressure and shear stress due to skin friction is presented. The noise due to skin friction and loading, in the rotor disk plane, is small compared to thickness noise. The basic conclusions of Boxwell et al about the importance of nonlinear effects are upheld. Some approximations involved in the current theories for the inclusion of nonlinear effects are discussed. Using a model nonlinear problem, it is shown that to use the acoustic analogy, good knowledge of the flowfield is required. M.M.M.

N79-26882# Georgia Inst. of Tech., Atlanta. School of Aerospace Engineering.
COMBUSTION NOISE PREDICTION: ENTROPY/VORTICITY EFFECTS Final Report, Sep. 1977 - Jan. 1979
Warren C. Strahle, M. Muthukrishnan, Douglas H. Neale, and Suresh K. Aggarwal Mar. 1979 153 p ref
(Contract DOT-FA77WA-4077)
(AD-A067993; FAA-RD-79-1) Avail: NTIS HC A08/MF A01 CSCL 20/1

An experimental and theoretical program was conducted to see if entropy noise and vorticity-nozzle interaction noise, as well as direct combustion noise, could be isolated in gas turbine combustor tests. Moreover, a unified correlation, with a rational theoretical basis, was developed for direct noise from combustor rig tests. It was found that: (1) vorticity noise was at least as large as combustion noise; (2) entropy noise is minor but is large only at low frequency; (3) all noise sources are coherent with each other over various frequency ranges; (4) with a choked nozzle termination the noise is higher frequency (approx. 2000 Hz) than heretofore believed; (5) some other unexplained noise source contaminated the results at low frequency; and (6) the diffuser used caused additional coherent noise, probably through the vorticity source. A method for accounting for the vorticity and entropy sources in combustion rig tests is indicated. Author

N79-26883*# Stanford Univ., Calif. Dept. of Aeronautics and Astronautics.
AERODYNAMIC SOUND GENERATION DUE TO VORTEX-AEROFOIL INTERACTION. PART 2: ANALYSIS OF THE ACOUSTIC FIELD
R. Parasarathy and K. Karamcheti Sep. 1972 75 p refs Sponsored in part by Army Mobility Res. and Develop. Command
(Contract NAS2-6158)
(NASA-CR-152231) Avail: NTIS HC A04/MF A01 CSCL 20A

The Lighthill method was the basic procedure used to analyze the sound field associated with a vortex of modified strength interacting with an airfoil. A free vortex interacting with an airfoil in uniform motion was modeled in order to determine the sound field due to all the acoustic sources, not only on the airfoil surfaces (dipoles), but also the ones distributed on the perturbed flow field (quadrupoles) due to the vortex-airfoil interaction. Because inviscid flow is assumed in the study of the interaction, the quadrupoles considered in the perturbed flow field are entirely due to an unsteady flow field. The effects of airfoil thickness on the second radiation are examined by using a symmetric Joukowski airfoil for the vortex-airfoil interaction. Sound radiation in a plane, far field simplification, and computation of the sound field are discussed. A.R.H.

N79-26884*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
ACOUSTIC AND AERODYNAMIC PERFORMANCE INVESTIGATION OF INVERTED VELOCITY PROFILE COANNULAR PLUG NOZZLES, COMPREHENSIVE DATA REPORT, VOLUME 1 Final Report
P. R. Knott, J. T. Blozy, and P. S. Staid May 1979 713 p 3 Vol.
(Contract NAS3-19777)
(NASA-CR-159575-Vol-1; R79AEG166-Vol-1) Avail: NTIS HC A99/MF A01 CSCL 20A

Volume 1 of a three volume report is presented. Volume 1 contains a description of the acoustic configurations, test facilities, data reduction techniques, test conditions, and detailed test results from the hot, static acoustic tests. G.Y.

N79-26885*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
ACOUSTIC AND AERODYNAMIC PERFORMANCE INVESTIGATION OF INVERTED VELOCITY PROFILE COANNULAR PLUG NOZZLES, COMPREHENSIVE DATA REPORT, VOLUME 2 Final Report
P. R. Knott, J. T. Blozy, and P. S. Staid May 1979 523 p 3 Vol.
(Contract NAS3-19777)
(NASA-CR-159575-Vol-2; R79AEG166-Vol-2) Avail: NTIS HC A22/MF A01 CSCL 20A

Volume 2 of a three volume report is presented. Volume 2 presents acoustic data comparisons in graphic form. G.Y.

N79-26886*# General Electric Co., Cincinnati, Ohio. Aircraft Engine Group.
ACOUSTIC AND AERODYNAMIC PERFORMANCE INVESTIGATION OF INVERTED VELOCITY PROFILE COANNULAR PLUG NOZZLES, COMPREHENSIVE DATA REPORT, VOLUME 3 Final Report
P. R. Knott, J. T. Blozy, and P. S. Staid May 1979 291 p 3 Vol.
(Contract NAS3-19777)
(NASA-CR-159575-Vol-3; R79AEG166-Vol-3) Avail: NTIS HC A13/MF A01 CSCL 20A

Volume 3 of a three volume report is presented. Volume 3 contains the detailed aerodynamic test results plus the concept screening and model design report. G.Y.

N79-26887# Naval Underwater Systems Center, New London, Conn.
NUMERICAL SOLUTIONS OF UNDERWATER ACOUSTIC WAVE PROPAGATION PROBLEMS
Ding Lee and John S. Papadkis 25 Feb. 1979 42 p refs
(AD-A067023; NUSC-TR-5929) Avail: NTIS HC A03/MF A01 CSCL 20/1

Contributions to solving initial boundary value problems for partial differential equations have been made by applying finite-difference methods to solve seismic wave propagation problems. Very little has been done in the area of underwater acoustic wave propagation problems, although a set of properly developed numerical methods could very well solve these problems effectively. These numerical methods can solve not only range-dependent problems but also can handle irregular boundaries with arbitrary boundary conditions. In this report, as a start, two accurate general purpose approaches are presented for the solution of variable coefficient parabolic wave equations. In a finite-difference approach, techniques are derived from both the conventional explicit and implicit schemes, and the associated convergence theory is thoroughly analyzed. The techniques are found to be general purpose and to provide reasonable accuracy. In an ordinary differential equation approach the parabolic equation is treated as a system of equations in which the second partial derivative with respect to the space variable is discretized by means of a second order central difference (also known as the Method of Lines). Nonlinear multistep (NLMS) and linear multistep (LMS) methods are used as predictor-and-corrector for solving this system. A built-in variable step-size technique gives the desired accuracy. GRA

N79-26888# Naval Ocean Systems Center, San Diego, Calif.
EVALUATION OF THE TWO-DIMENSIONAL FOURIER TRANSFORM APPLIED TO ACOUSTIC IMAGE PATTERN MEASUREMENTS Final Report, Oct. 1977 - Jun. 1978
Robert S. French 30 Nov. 1978 36 p refs
(AD-A068017; NOSC/TR-354) Avail: NTIS HC A03/MF A01 CSCL 17/1

The objective of this experimental study was to evaluate the use of the two-dimensional Fourier transform as an aid in extracting spatial frequency components in acoustic data images by means of direct operator observation. More specifically, the study addressed the question of the relative gain in precision of measurement which might be realized using the two-dimensional transform as compared to making these measurements directly from the original image. Of particular interest was the amount of gain at the weaker signal strengths typical of the class of processed acoustic data under investigation. As the signal power in the image decreases relative to the noise power, the probability increases that energy concentrations resulting from random noise patterning will appear in the transformed image. It is possible, therefore, that the human operator working with the original image alone may be able to separate signal related patterning from spurious noise patterning as well as can be achieved by using the transform. The experiment reported herein was designed to provide a definitive test of this hypothesis. Results showed that at high SNR levels the transform domain image representation was clearly superior to the original image as a mode for systematic measurement and ranking of periodic spatial features in the image. As the SNR level was reduced the accuracy of measurement in the transform domain fell off more rapidly than the original image domain, resulting in a convergence of the performance curves under the two modes. With the SNR level reduced so that the signal-related patterning was barely perceptible, measurement of periodic spatial features in the transform domain was no better than in the original image domain. Author (GRA)

N79-26889# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiaziiowi.
DECISION PROBLEMS IN MULTISTATIC SONAR SYSTEMS [LA TOMOGRAFIA ASSIALE COMPUTERIZZATA]
F. P. Gentile, F. Sabetta, and V. Troi (Ospedale S. Camillo) 15 Mar. 1978 79 p refs In ITALIAN; ENGLISH summary
(ISS-R-78/4) Avail: NTIS HC A05/MF A01

Results show that an active multistatic sonar system consisting of a sound projector and several spatially distributed receivers, last of which are linked to a central processing station, is feasible. By properly combining the single observations it is possible to decide whether there is a target present or not. The structure of an ideal detector, assuming that the signals that are observed at the single sensors are completely available at the central processing station, was studied. Under the more realistic restriction that the sensors are only allowed to transmit target/no target decisions, the possibility of constructing a suboptimal detector was then considered. Author (ESA)

N79-26890# National Physical Lab., Teddington (England). Div. of Acoustics.
MANUAL AUDIOMETRY: A COMPARISON OF TWO METHODS
M. S. Shipton Nov. 1978 32 p ref
(NPL-Ac-88) Avail: NTIS HC A03/MF A01

Hearing threshold measurements were made on a group of people using an ascending and a bracketing method of manual audiometry. The ascending method took less time than the bracketing method and gave hearing threshold levels which were on average 0.5 dB better than the bracketing method. Learning characteristics of the two methods are discussed. Author (ESA)

72 ATOMIC AND MOLECULAR PHYSICS

Includes atomic structure and molecular spectra.

N79-26891 Houston Univ., Tex.
COMPUTER-AIDED INVESTIGATION OF REACTION PATH SYNTHESIS Ph.D. Thesis
Bajani Bhushan Agnihotri 1978 198 p
Avail: Univ. Microfilms Order No. 7906268

A user oriented system, CHIRP, was set up with the goal of identifying various possible product sets emanating from a given set of reactant molecules. The atom connectivity matrix representation of molecules is chosen because it is suitable for storage, retrieval and manipulation in a data processing environment. Algorithms which can encode both acyclic compounds and compounds containing rings in a unique canonical form are described. The sparse connectivity matrices are converted to a vector form to minimize core requirements for storage and manipulation. Selection of product sets formed at any level is based on the minimum free energy of reaction and is used to create reactant sets for the succeeding level. Dissert. Abstr.

N79-26892# Texas Univ. at Austin. Dept. of Chemistry.
DEVELOPMENT OF PRACTICAL MO TECHNIQUES FOR PREDICTION OF THE PROPERTIES AND BEHAVIOR OF MATERIALS Final Technical Report, 1 Nov. 1974 - 31 Oct. 1978
Michael J. S. Dewar 31 Oct. 1978 21 p refs
(Grant AF-AFOSR-2749-75)
(AD-A067068; AFOSR-79-0340TR) Avail: NTIS HC A02/MF A01 CSCL 07/3

A new semiempirical method (MNDO), based on NDDO, has proved superior to MINDO/3 in nearly all respects. Parameters are available for H, Be, B, C, N, O, F, and (without 3d AOs) Si, P, S, and Cl. MINDO/3 and MNDO give good estimates of molecular vibration frequencies and isotopic shifts, and hence of entropies, specific heats, entropies of activation, and kinetic isotope effects. MNDO calculations were carried out for a number of normal and mesoionic oxazoles and imidazoles and for pentadienyl ions and their methyl derivatives. Author (GRA)

N79-26893# Army Cold Regions Research and Engineering Lab., Hanover, N. H.
BLANK CORRECTIONS FOR ULTRATRACE ATOMIC ABSORPTION ANALYSIS
James C. Cragin and Steven T. Quarry Jan. 1979 11 p refs
(Grant NSF DPP-78-17165)
(AD-A066979; CRREL-79-3) Avail: NTIS HC A02/MF A01 CSCL 07/4

Both flame and flameless atomic absorption (AA) measurements require a distilled water blank correction. This correction is due to the analyte contained in the distilled water used to prepare the standards and not, as commonly thought, to the reference blank used to zero the instrument. Flameless AA analyses of acidified heavy metal samples generally require additional corrections for the furnace deflection blank and for an acid blank. To prevent adsorption losses, the acid blank should be determined by extrapolation of a series of acid dilutions in distilled water. Author (GRA)

N79-26894# California Univ., Berkeley. Dept. of Chemistry.
CROSSED MOLECULAR BEAM STUDY OF THE REACTIONS OF OXYGEN AND FLUORINE ATOMS Annual Summary Report, Jan. 1978 - Feb. 1979
Yuan T. Lee 1 Mar. 1979 82 p refs
(Contract N00014-75-C-0671)
(AD-A067848; UC-75-C-0671-78) Avail: NTIS HC A05/MF A01 CSCL 07/4

Progress has been made in our understanding of oxygen and fluorine reaction chemistry through the study of several new reactions as well as the completed analysis of data obtained in the previous contract period. We have made further technological advances which will increase our ability to study O(3P) reactions and we have taken the initial steps to develop an O(1D) source. In the first three sections, the developments in the source technology and chemistry are discussed. First, in the photofragmentation spectroscopy of O3 to yield O(1D), the vibronic states of the dissociation product was resolved. Then, a discussion of the O(3P) source as used in the exciting studies of iodine abstraction reactions is presented. Lastly, we report the improvements which were made to increase the intensity, Mach number, and energy variability of the O(3P) source. Section four describes the completed high resolution of the reaction of O(3P) with ICl and CF3I in which we were able to obtain an improved value of the IO bond energy. The reactions of Cl and F with C2H3Br, discussed in section five, contribute significantly to our understanding of the dynamics of chemical reactions. The nonstatistical product energy distributions and unexpected coupling of angular and energy distributions shed light on the mechanism of radical reactions and the importance of angular momentum. Author (GRA)

N79-26895# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
SYMMETRIES AND STATISTICAL BEHAVIOR IN FERMION SYSTEMS
J. B. French and J. P. Draayer (La. State Univ., Baton Rouge) 1978 15 p refs Presented at Conf. on Group Theory and Appl. Math., Ontario, Canada, Sep. 1978
(Contract EY-76-S-02-2171)
(COO-2171-184; UR-673; Conf-780991-1) Avail: NTIS HC A02/MF A01

The interplay between statistical behavior and symmetries in nuclei, as revealed, for example, by spectra and by distributions for various kinds of excitations is considered. Methods and general results, rather than specific applications, are given. DOE

N79-26896# Argonne National Lab., Ill.
PULSED NEUTRON MEASUREMENT OF SINGLE AND TWO-PHASE LIQUID FLOW
Paul Kehler 1978 6 p refs Presented at 5th Conf. on Application of Small Accelerators, Denton, Tex., 6 Nov. 1978
(Contract W-31-109-eng-38)
(CONF-781113-31) Avail: NTIS HC A02/MF A01

Improvements offered by pulsed neutron activation (PNA) techniques over conventional radioisotope techniques are (1) non-intrusion into the system; (2) easier introduction and better mixing of the tracer; and (3) no requirement to handle large amounts of relatively long lived radioactive materials. Flow velocity measurements by PNA methods can be based on the transit-time or the total-count method. A very significant difference of the PNA technique from conventional methods is that the induced activity is proportional to the density of the fluid, and that PNA techniques can be used for density measurements (of two-phase flows) in addition to flow velocity measurement. Original equations were derived that relate experimental data to the mass flow velocity and the average density. The accuracy of these equations is not effected by the flow regime. Experimental results are presented for tests performed on liquid sodium loops, on air-water loops, on the EBR-2 reactor and on the LOFT reactor. Current instrumentation development programs (detectors, pulsed neutron sources) are discussed. DOE

N79-26897# Rochester Univ., N. Y.
LOW ENERGY ION-MOLECULE REACTION DYNAMICS AND CHEMIIONIZATION KINETICS Progress Report, 1 Feb. 1978 - 31 Jan. 1979
James M. Farrar 1979 11 p refs
(Contract ER-78-S-02-4894)
(COO-4694-1) Avail: NTIS HC A02/MF A01

A crossed molecular beam apparatus for the study of low energy ion-molecule reactions and free-radical chemiionization kinetics was constructed, and used in the study of reactions of H2(+) + CO, N2, and Ar at energies between 5 and 10 eV. The preliminary results obtained indicate that in the energy range studied, the reactions proceed via impulsive, direct collisions. The molecular ion products are scattered in the backward direction with respect to the incoming H2(+) projectile with translational energy in excess of that predicted by spectator stripping. Also completed was the construction of a discharge ion-source with a sample vaporization compartment, allowing solids and liquids to be used as source materials. This source will be used to prepare HCO(+) beams for studies of reactions such as HCO(+) + H2O(+)H3O(+) + CO considered important in hydrocarbon flames. DOE

N79-26898# Rochester Univ., N. Y.
PION DISSOCIATION IN THE NUCLEAR COULOMB FIELD
D. Berg, C. Chandlee, S. Cihangeir, T. Ferbel, Y. Fukushima, T. Jensen, F. Lobkowicz, C. N. Nelson, Jr., P. Ohshima, and P. Slattery 1978 12 p refs Prepared in cooperation with Fermi National Accelerator Lab., Batavia, Ill. and Minnesota Univ., Minneapolis
(Contract EY-76-C-02-1764)
(COO-1764-337; Conf-780826-18) Avail: NTIS HC A02/MF A01

A forward spectrometer detecting both charged particles and photons was used to study the excitation of pions in the Coulomb field of heavy nuclei. The results were analyzed to yield a new value for Gamma (neg p yields neg pi gamma) and an upper limit Gamma (neg A sub 2 yields neg pi gamma) was obtained. DOE

N79-26899# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazione.
VALIDITY OF THE FACTORIZED DWIA IN e, e1p REACTIONS
S. Boffi (Pavia Univ.), S. Frulani (Pavia Univ.), E. Giusti (Pavia Univ.), and F. D. Pacati 7 Sep. 1978 29 p refs Submitted for publication
(ISS-P-78/8) Avail: NTIS HC A03/MF A01

The validity of the factorization in the cross section of quasi-free (e, e1p) reactions is discussed. The results of the conventional Distorted Wave Impulse Approximation (DWIA) analysis are compared with those obtained in a general approach in which the reaction cross section is written without the factorization in terms of the non-diagonal spectral function and the offshell two-body electron-nucleon scattering amplitude. Numerical results for the reaction 12C(e, e1p)11B are given under different kinematical conditions. Results show that the validity of the factorized DWIA analysis is limited by the kinematical conditions. Author (ESA)

N79-26900# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
REALISTIC INTERACTIONS AND VARIATIONAL CALCULATIONS OF THE GROUND STATE PROPERTIES OF THREE BODY SYSTEMS ON A HARMONIC OSCILLATOR BASIS
E. Pace (Rome Univ.), P. Nunberg (Comitato Nazl. pel l'Energia Nucl.), and D. Prosperi (Naples Univ.) 30 Sep. 1978 35 p refs Presented at Workshop on Few Body Syst. and Electromagnetic Interactions, Frascati, Italy, Mar. 1978 Submitted for publication
(ISS-P-78/10) Avail: NTIS HC A03/MF A01

A harmonic oscillator basis for trinucleon ground-state calculations is presented featuring different oscillator radii for the two intrinsic variables. This basis allows charge-dependent interactions to be handled and yields a better convergence with respect to previously used oscillator bases. The results for the triton binding energy and for the charge form factors of 3H and 3He with the Reid softcore interaction and the charge-dependent Rutherford Laboratory interaction are presented. Author (ESA)

N79-26901# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.

ELECTRODISINTEGRATION OF FEW-BODY SYSTEMS AND REALISTIC INTERACTIONS

C. CiofiDegliAtti (Ist. Nazl. di Fis. Nucl.), E. Pace, and G. Salme (Ist. Nazl. di Fis. Nucl.) 10 Oct. 1978 27 p refs Presented at Workshop on Few Body Systems and Electromagnetic Interactions, Frascati, Italy, Mar. 1978 Submitted for publication

(ISS-P-78/11) Avail: NTIS HC A03/MF A01

The three-body electrodisintegration of triton in the quasi-elastic region is studied using a variational three-body wave function corresponding to the Reid soft core interaction. The spectral function of the process 3H(e, e1p)2N is calculated and its dependence on the wave function components and the neutron-neutron final state interaction is thoroughly investigated. The calculated angular distributions of the coincidence cross section, which agree at low values of the proton internal momentum with the existing experimental data, display at large values of the proton momentum a sizable effect from the triton D wave. The importance of the triton D wave has also been found in the high energy tail of the quasi elastic peak.

Author (ESA)

N79-26902# Istituto Superiore di Sanita, Rome (Italy).

A PRELIMINARY STUDY ON THE DOSIMETRIC PROPERTIES OF CaSO4: DYRIBBON (TLD-900)

C. Bacci (Rome Univ.), A. Calicchia, C. Furetta, L. Pugliani (Rome Univ.), and P. Salvadori 15 Nov. 1978 15 p refs Submitted for publication

(ISS-P-78/14) Avail: NTIS HC A02/MF A01

Solid thermoluminescent CaSO4: Dy (TLD-900) dosimeters put on the market were studied. Preliminary results on annealing, glow-curve, short-time fading, dose and energy response as well as reproducibility of TLD-900 ribbons are presented. Applicability to very low dose radiation therapy and diagnostic dosimeter measurements are indicated. Author (ESA)

73 NUCLEAR AND HIGH-ENERGY PHYSICS

Includes elementary and nuclear particles; and reactor theory.

For space radiation see *93 Space Radiation*.

N79-26903 Illinois Univ. at Urbana-Champaign, Urbana.

HADRON PRODUCTION IN HIGH ENERGY MUON SCATTERING Ph.D. Thesis

Randall Gardner Hicks 1978 289 p

Avail: Univ. Microfilms Order No. 7913484

An experiment to study muon-proton scattering at an incident energy of 225 GeV and a total effective flux of 4.3 times 10 to the 10th power muons is presented. The experiment was able to detect charged particles in coincidence with the scattered muon in the forward hemisphere. Results for the neutral strange particles K degrees sub s (kaon) and Lambda degree (Lambda hyperon) decaying into two charged particles are reported. The distribution of hadrons produced in muon scattering was determined, momentum components parallel and transverse to the virtual photon direction were measured, and the distributions are compared to other high energy experiments involving the scattering of pions, protons, and neutrinos from protons. Structure functions for hadron production and particle ratios were calculated. Dissert. Abstr.

N79-26904# Analytic Sciences Corp., Reading, Mass.

INFORMATION BASE FOR WASTE REPOSITORY DESIGN, VOLUME 5: DECOMMISSIONING OF UNDERGROUND FACILITIES

Michael S. Giuffre, Robert L. Plum, Charles M. Koplik, and Richard Talbot Mar. 1979 96 p refs Prepared in cooperation with Golder Assoc., Inc. 7 Vol.

(Contract NRC-02-77-129)

(PB-293405/7; TASC-TR-1210-1-Vol-5; NUREG-CR-0495-Vol-5) Avail: NTIS HC A05/MF A01; also available in set of 7 reports HC E17 as PB-293400-SET CSCL 18G

The requirements for decommissioning a deep underground facility for the disposal of radioactive waste are discussed. The techniques for sealing the mined excavations are presented and an information base on potential backfill materials is provided. Possible requirements for monitoring the site are discussed. The performance requirements for backfill materials are outlined. The advantages and disadvantages of each sealing method are stated. GRA

N79-26905# Stanford Linear Accelerator Center, Calif.

HARMONY IN SCIENCE: SUPERCONDUCTIVITY AND HIGH ENERGY PHYSICS

Steve J. St.Lorant Nov. 1978 8 p refs Presented at Appl. Superconductivity Conf., Pittsburgh, 25-28 Sep. 1978

(Contract EY-76-C-03-0515)

(SLAC-Pub-2237; Conf-780952-45) Avail: NTIS HC A02/MF A01

Particle physics requires a bewildering array of technologically sophisticated equipment: from the instant when particles are injected into the accelerator through the acceleration process, beam extraction, separation, and steering to the instant of collision and analysis of the interaction products, superconducting devices play a most important role. Each step in this process is examined; how the latest advances in superconductivity were applied is described, as well as why these developments necessarily took place. In spite of considerable fiscal restraint, high-energy physics is entering a period of major construction activity. Thus, if history repeats itself, there will soon be a flood of innovations, each intended to alleviate some problem brought on by increasingly expensive power and rising production costs, not to mention the constant clamor for higher accelerator energies and greater resolution of the detection equipment. DOE

N79-26906# Sandia Labs., Albuquerque, N. Mex.

RISK METHODOLOGY FOR GEOLOGIC DISPOSAL OF RADIOACTIVE WASTE

James E. Campbell, Richard T. Dillon, Martin S. Tierney, Herbert T. Davis, Peter E. McGrath, F. Joe Pearson, Jr. (Geol. Survey), Herbert R. Shaw (Geol. Survey), Jon C. Helton (Arizona State Univ.), and Fred A. Donath (Illinois Univ., Urbana-Champaign) Oct. 1978 264 p refs

(Contracts EY-76-C-04-0789; DOE-40-550-75; NRC-FIN-A-1192)

(NUREG/CR-1458; SAND-78-0029) Avail: NTIS HC A12/MF A01

Steps to be taken in the development of a methodology for the assessment of the long-term risks from radioactive waste disposal in deep, geologic media are outlined. The first phase involves the development of analytical models to represent the processes by which radioactive waste might leave the waste repository, enter the surface environment and eventually reach humans, and the definition of a hypothetical reference system to provide a realistic setting for exercise of the models in a risk or safety assessment. The analytical methods and data developed in this study are expected to form the basis for a portion of NRC repository licensing methodology. DOE

N79-26907# Golder Associates, Inc., Kirkland, Wash.

SCOPING STUDY OF SALT DOMES, BASALTS AND CRYSTALLINE ROCK AS RELATED TO LONG TERM RISK MODELING FOR DEEP GEOLOGIC DISPOSAL OF NUCLEAR WASTE

Nov. 1978 125 p refs

(Contract W-7405-eng-48)

(UCRL-13945) Avail: NTIS HC A06/MF A01

A preliminary geotechnical data base is provided to initiate the development of long-term risk models for salt domes, basalt, and crystalline rock. Geology, hydrology, specific sites, and potential release pathways are considered for each type. A summary table of site suitability characteristics is presented. DOE

N79-26908# Johnson (E. R.) Associates, Inc., Vienna, Va.

ALTERNATIVE WASTE MANAGEMENT OPTIONS, NUCLEAR FUEL SERVICES, INC., HIGH LEVEL WASTE Final Report

10 May 1978 164 p refs Prepared for Argonne Natl. Lab., Ill.

(Contract W-31-109-eng-38)
(ANL-K-78-4190-2) Avail: NTIS HC A08/MF A01

Of the alternatives considered for disposal of the high-level waste in tanks 8D2 and 8D4, the following process is recommended: homogenization of the contents of tank 8D2, centrifugation of the sludge, and supernate, mixing of the 8D4 acid waste with the centrifuged sludge, and converting the mixture to a borosilicate glass using the Hanford spray calciner/in-can melter. DOE

N79-26909# Sandia Labs., Albuquerque, N. Mex.
SEABED DISPOSAL PROGRAM, VOLUME 1 Annual Report, Jan. - Dec. 1977
Daniel M. Talbert, ed. Jan. 1979 55 p refs
(Contract EY-76-C-04-0789)
(SAND-78-1359) Avail: NTIS HC A04/MF A01

At the conclusion of the fourth year of the program, it can again be stated that no technological or environmental reasons are identified that would preclude the possibility of successful disposal high level nuclear wastes or spent fuel in stable, sedimentary formations beneath the abyssal floors of the deep oceans. DOE

N79-26910# Los Alamos Scientific Lab., N. Mex.
GENERAL-PURPOSE HEAT SOURCE PROJECT, SPACE NUCLEAR SAFETY PROGRAM, AND RADIOISOTOPIC TERRESTRIAL SAFETY PROGRAM Monthly Progress Report, Nov. 1978
R. D. Baker, Comp. Jan. 1979 40 p
(Contract W-7405-eng-36)
(LA-7651-PR) Avail: NTIS HC A03/MF A01

Studies related to the use of (Pu-238)O2 in radioisotopic power systems are reported. Topics covered include design impact tests for a general-purpose heat source; closure ablation tests; fuel development; container material development; and support for the Stirling isotope power system. Six terrestrial environment chamber experiments are described as well as those conducted in a terrarium, a soil column, and in an aquatic environment. A.R.H.

N79-26911# Battelle Pacific Northwest Labs., Richland, Wash.
STORAGE AND DISPOSAL OF RADIOACTIVE WASTE AS GLASS IN CANISTERS
J. E. Mendel Dec. 1978 97 p
(Contract EY-76-C-06-1830)
(PNL-2764) Avail: NTIS HC A05/MF A01

The use of waste glass for the immobilization of high-level radioactive waste glass is reviewed. Typical properties of the canisters used to contain the glass, and the waste glass, are described. Those properties are used to project the stability of canisterized waste glass through interim storage, transportation, and geologic disposal. DOE

N79-26912# Rochester Univ., N. Y. Dept. of Physics and Astronomy.
HADRON-NUCLEUS INCLUSIVE DATA FROM FERMILAB
T. Ferbel 1978 27 p refs Presented at 19th Intern. Conf. on High Energy Physics, Tokyo, 23 Aug. 1978
(Contract EY-76-C-02-3065)
(COO-3065-210; Conf-780826-23; UR-669) Avail: NTIS HC A03/MF A01

Results from seven experiments conducted at Fermilab to study the inclusive production of particles in Hadron-nucleus collisions are summarized. DOE

N79-26913# Brookhaven National Lab., Upton, N. Y.
GABOR LENS THEORY
A. A. Irani 1978 8 p refs Presented at Heavy Ion Fusion Workshop, Chicago, 19 Sep. 1978
(Contract EY-76-C-02-0016)
(BNL-25023; Conf-780979-1) Avail: NTIS HC A02/MF A01

The principle of using the space charge of an electron cloud to focus ion beams was first proposed by Gabor. Electrons are to be confined radially by means of an axial magnetic field B/sub z/ and axially by means of externally applied electric fields E/sub z/. An ion beam of charge density n/sub i/ much less than n/sub e/, the electron charge density can then be focused by the radial electric field set up by the electron cloud. The case considered is that of a hollow cylindrical conductor charged to a potential +V with grounded rings on either side to set up the axial E/sub z/ field. A solenoid wound around the central conductor supplies the B/sub z/ field. Theoretical calculations are carried out for n/sub e/ maximum as a function of B/sub z/ due to radial confinement and V due to axial confinement and the focal length of the Gabor Lens is calculated. DOE

N79-26914# Stanford Linear Accelerator Center, Calif.
WEAK INTERACTIONS AT HIGH ENERGIES
J. Ellis Aug. 1978 100 p refs
(Contract EY-76-C-03-0515)
(SLAC-PUB-2177) Avail: NTIS HC A05/MF A01

Review lectures are presented on the phenomenological implications of the modern spontaneously broken gauge theories of the weak and electromagnetic interactions, and some observations are made about which high energy experiments probe what aspects of gauge theories. Basic quantum chromodynamics phenomenology is covered with emphasis momentum dependent effective quark distributions; the transverse momentum cutoff; search for gluons as sources of hadron jets; the status and prospects for the spectroscopy of fundamental fermions and how fermions may be used to probe aspects of the weak and electromagnetic gauge theory. Intermediate vector bosons are discussed as well as miscellaneous possibilities suggested by gauge theories from the Higgs bosons to speculations about proton decay. DOE

N79-26915# Argonne National Lab., Ill.
IMPLICATIONS OF NUCLEON-NUCLEAR SPIN-POLARIZATION MEASUREMENTS
A. C. Irving (Liverpool Univ.), E. L. Berger, and C. Sorensen 1978 7 p refs Presented at 3d Intern. Symp. on HEP with Polarized Beams and Polarized Targets, Argonne, Ill., 25-28 Oct. 1978
(Contract W-31-109-eng-38)
(ANL-HEP-CP-78-48; Conf-781095-5) Avail: NTIS HC A02/MF A01

The available data on polarized nucleon-nucleon elastic scattering are interpreted. By comparing these with the simplest exchange model predictions, features of particular interest such as low-lying A sub 1-like and isoscalar exchanges, and a helicity-flip Pomeron component can be identified. The maximum-simplicity Regge model is intended to facilitate interpretation of forthcoming pp amplitude analysis results. DOE

N79-26916# Brookhaven National Lab., Upton, N. Y.
BEAM FOIL SPECTROSCOPY OF HEAVY IONS AT ENERGIES FROM 20 TO 238 MeV
K. W. Jones 1978 9 p refs Presented at the Intern. Conf. on Fast Ion Spectry.; 5th Intern. Beam Foil Conf., Villeurbanne, France, 5-8 Sep. 1978
(Contract EY-76-C-02-0016)
(BNL-24909; Conf-780988-5) Avail: NTIS HC A02/MF A01

The beam foil spectra of beams of Ti, Cu, Ni, Br, Mo, I, W, and Au were surveyed in the wavelength region 5 to 60 nm for beam energies ranging from 20 to 238 MeV. Problems involved in making lifetime measurements for selected states were also investigated. DOE

N79-26917# Department of Energy, Washington, D. C.
ANALYTICAL METHODOLOGY AND FACILITY DESCRIPTION SPENT FUEL POLICY
Aug. 1978 287 p refs
(DOE/ET-0054) Avail: NTIS HC A13/MF A01

Three generic environmental impact statements (GEISs) on domestic fuels, foreign fuels, and storage charges are being prepared to provide environmental input into decisions on whether, and if so how the 1977 Presidential policy on spent fuel storage should be implemented. Background information is provided for two of these environmental impact statements: Storage of U.S. Spent Power Reactor Fuel and Storage of Foreign Spent Power Reactor Fuel. The analytical methodology used in GEISs to assess the environmental effects and a description of the facilities used in the two GEISs are included. DOE

N79-26918# Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
GEOTECHNICAL ASPECTS OF SUBSURFACE SEABED DISPOSAL OF HIGH LEVEL RADIOACTIVE WASTES Annual Progress Report, Jan. - Dec. 1977
A. J. Silva and D. I. Calnan May 1978 142 p refs
(Contract EY-76-S-02-4069)
(COO-4069-1) Avail: NTIS HC A07/MF A01

The status of the following major studies is reported: geotechnical properties of deep sea clays; experimental water migration studies; laboratory hole closure experiments; and in-site heat transfer experiments. DOE

N79-26919# Acres American, Inc., Buffalo, N. Y.
INJECTION OF RADIOACTIVE WASTE BY HYDRAULIC FRACTURING AT WEST VALLEY, NEW YORK. VOLUME 4, SUPPLEMENT 1: COST ESTIMATE
A. S. Burgess and S. N. Thompson May 1978 27 p Prepared in cooperation with Terr Tek, Inc., Salt Lake City
(Contract W-31-109-eng-38)
(ANL-K-78-4238-1-Vol-4) Avail: NTIS HC A03/MF A01

The costs for injecting 3 million gallons of waste-grout mix in 200,000-gallon batches over 2 years are estimated to be 9.75 million dollars (including direct, indirect, operational, and decommissioning costs). DOE

N79-26920# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni.
FUTURE REQUIREMENTS AND PRESENT PERSPECTIVES IN DATA HANDLING FOR HIGH ENERGY PHYSICS EXPERIMENTS
R. Biancastelli and A. Giordana (Politec. di Torino) 6 Mar. 1978 18 p refs
(ISS-T-78/5) Avail: NTIS HC A02/MF A01

Problems are discussed and possible solutions are envisaged for the improvement of the CAMAC data acquisition system. The method involves taking full advantage of ECL and Shottky TTL technologies, with cycle time reduction to 100 nsec or less, and increasing the speed of the data processing system by using parallel processing. The discussion includes a set of suggestions for the implementation of multiprocessing in a general form on the FAST system as presented at the European ESONE-ASSG meeting. Author (ESA)

N79-26921# Istituto Superiore di Sanita, Rome (Italy). Lab. delle Radiazioni
INFORMATION ON NUCLEON-NUCLEON INTERACTION FROM NUCLEAR MATTER CALCULATIONS
O. Benhar (1st. Nazl. di Fis. Nucl.) and C. CiofiDegliatti (1st. Nazl. di Fis. Nucl.) 10 Oct. 1978 19 p refs Presented at Workshop on Few-body Systems and Electromagnetic Interactions, Frascati, Italy, Mar. 1978
(ISS-P-78/12) Avail: NTIS HC A02/MF A01

Recent calculations of nuclear matter properties performed within the framework of the Brueckner-Bethe-Goldstone theory and the variational approach based on Jastrow-type wave functions are reviewed. The information that can be gained on the nucleon-nucleon interaction is discussed and the overbinding of nuclear matter predicted by the Reid soft core interaction is pointed out. Author (ESA)

N79-26922# Analytic Sciences Corp., Reading, Mass.
INFORMATION BASE FOR WASTE REPOSITORY DESIGN. VOLUME 1: BOREHOLE AND SHAFT SEALING
Charles M. Koplik, David L. Pentz, and Richard Talbot Mar. 1979 124 p refs Prepared in cooperation with Golder Assoc., Inc. 7 Vol.
(Contract NRC-02-77-129)
(PB-293401/6; TASC-TR-1210-1-Vol-1;
NUREG-CR-0495-Vol-1) Avail: NTIS HC A06/MF A01; also available in set of 7 reports HC E17 as PB-293400-SET CSCL 18G

The design requirements and the current technology for sealing shafts and boreholes in an underground disposal facility for nuclear waste are discussed. The discussion is focused upon repositories for high-level waste disposal in bedded salt. The type of data necessary to evaluate a particular proposal for shaft or borehole sealing is presented. GRA

N79-26923# Analytic Sciences Corp., Reading, Mass.
INFORMATION BASE FOR WASTE REPOSITORY DESIGN. VOLUME 2: EQUIPMENT PERFORMANCE REQUIREMENTS
Charles M. Koplik, David L. Pentz, and Richard Talbot Mar. 1979 132 p refs Prepared in cooperation with Golder Assoc. Inc. 7 Vol.
(Contract NRC-02-77-129)
(PB-293402/4; TASC-TR-1210-1-Vol-2) Avail: NTIS HC A07/MF A01; also available in set of 7 reports HC E17 as PB-293400-SET CSCL 18G

Equipment requirements for the operation of a nuclear waste repository are described. Only equipment which can significantly affect nuclear safety is considered. A conceptual repository layout is presented and mining and ventilation methods are reviewed. Major emphasis is placed on nuclear waste handling operations, since these are peculiar to the situation at hand. A discussion of existing applicable regulations is also included. GRA

N79-26924# Analytic Sciences Corp., Reading, Mass.
INFORMATION BASE FOR WASTE REPOSITORY DESIGN. VOLUME 3: WASTE/ROCK INTERACTIONS
Charles M. Koplik, Stephen G. Oston, David L. Pentz, and Richard Talbot Mar. 1979 137 p refs Prepared in cooperation with Golder Assoc., Inc. 7 Vol.
(Contract NRC-02-77-129)
(PB-293403/2; TASC-TR-1210-1-Vol-3;
NUREG-CR-0495-Vol-3) Avail: NTIS HC A07/MF A01; also available in set of 7 reports HC E17 as PB-293400-SET CSCL 18G

Nuclear waste repository design issues are reported including the important effects resulting from interaction between radioactive waste and the rock in a nuclear waste repository. The state-of-the-art in predicting waste/rock interactions is summarized. Where possible, independent numerical calculations have been performed. Recommendations are made pointing out areas which require additional research. GRA

N79-26925# Analytic Sciences Corp., Reading, Mass.
INFORMATION BASE FOR WASTE REPOSITORY DESIGN. VOLUME 4: MINE STRUCTURAL FEATURES
R. John Byrne, Charles M. Koplik, Stephen G. Oston, Michael S. Giuffre, and Larry R. Myer Mar. 1979 373 p refs Prepared in cooperation with Golder Assoc., Inc. 7 Vol.
(Contract NRC-02-77-129)
(PB-293404/0; TASC-TR-1210-1-Vol-4;
NUREG-CR-0495-Vol-4) Avail: NTIS HC A16/MF A01; also available in set of 7 reports HC E17 as PB-293400-SET CSCL 18G

The mine structural features of an underground nuclear waste disposal facility which are important to repository operation, waste retrieval, and long-term waste containment are discussed. Emphasis is on repositories for high-level waste disposal in bedded salt, although much of the material is relevant to other geologic disposal mediums. The results of a numerical structural analysis of a depository in bedded salt are presented. GRA

N79-26926# Analytic Sciences Corp., Reading, Mass.
INFORMATION BASE FOR WASTE REPOSITORY DESIGN. VOLUME 6: EXCAVATION TECHNOLOGY
Charles M. Koplik, David L. Pentz, and Richard Talbot Mar. 1979 85 p refs Prepared in cooperation with Golder Assoc., Inc. 7 Vol.
(Contract NRC-02-77-129)
(PB-293406/5; TASC-TR-1210-1-Vol-6;
NUREG-CR-0495-Vol-6) Avail: NTIS HC A05/MF A01; also available in set of 7 reports HC E17 as PB-293400-SET CSCL 18G

Nuclear waste repository design issues are discussed with emphasis on the excavation technology to be used for a nuclear waste facility in a deep geologic formation. Particular emphasis is placed on the requirement to minimize the disturbance to the depository rock. This can reduce the probability of radionuclide migration through the rock surrounding the excavation. An information base is provided to assist in the evaluation of mining methods. A methodology is presented which can be used to determine performance requirements for excavation techniques. GRA

N79-26927# Analytic Sciences Corp., Reading, Mass.
INFORMATION BASE FOR WASTE REPOSITORY DESIGN. VOLUME 7: EXECUTIVE SUMMARY
John W. Bartlett, David L. Pentz, and Richard Talbot Mar. 1979 27 p Prepared in cooperation with Golder Assoc., Inc. 7 Vol.
(Contract NRC-02-77-129)
(PB-293407/3; TASC-TR-1210-1-Vol-7;
NUREG-CR-0495-Vol-7) Avail: NTIS HC A03/MF A01; also available in set of 7 reports HC E17 as PB-293400-SET CSCL 18G

Studies in support of design performance criteria for radioactive waste repositories were performed to develop information bases concerning shaft and borehole sealing, equipment performance requirements, waste/rock interactions, mine structural features, decommissioning performance, and excavation technology requirements. Results are summarized under four headings: factors that are currently adequate, technology needing further development, critical information needs, and prudent repository operating procedures. Design option studies that are needed and the interactions between repository design and overall waste management strategy are also discussed. GRA

74 OPTICS

Includes light phenomena.

N79-26928 Georgia Inst. of Tech., Atlanta.
FREQUENCY-VARIANT OPTICAL SIGNAL PROCESSING Ph.D. Thesis
James Martin Florence 1979 209 p
Avail: Univ. Microfilms Order No. 7913794

A general frequency-variant spectrum analyzer was developed with the capability of mapping signal spectral components along an arbitrary frequency axis and displaying these components with frequency dependent resolution characteristics. An optical system for processing temporal signal waveforms uses the frequency-variant spectrum analyzer system in conjunction with an interferrometric optical heterodyne processor. The capability of the frequency-variant analyzer to control the position and resolution of signal components allows for the very general mixing of a signal and a local oscillator. This mixing results in a frequency dependent redistribution of the signal components useful for bandwidth compression and expansion or for more general spread-spectrum signaling. The practical problems associated with the implementation of the signal waveform processor are considered. Dissert. Abstr.

N79-26929 California Univ., Irvine.
OPTICAL TRANSMISSION CHARACTERIZATION OF FLASH EVAPORATED AMORPHOUS Se-Ge FILMS Ph.D. Thesis
Jai Krishan Hakhu 1979 109 p
Avail: Univ. Microfilms Order No. 7913959

The variable composition amorphous Se-Ge thin films were fabricated using flash evaporation. The feed rate, on an average was about .04 gms per flash, which gave an evaporation rate of about 60-80A per flash. The optical transmission studies show dependence of transmission edge on the composition of the alloy. A photolightening (photobleaching) effect was observed in the germanium rich film Se25Ge75, while the selenium rich film Se78Ge22 showed a photodarkening effect. A change in the transmission edge of Se25Ge75 and Se78Ge22 films of .2 nm and .4 nm was observed upon the light irradiation of 3 mw for 22 hours and 12 hours, respectively. Energy coefficient, defined by delta log (transmission)/delta(energy), is positive for Se25Ge75 film and negative for Se78Ge22 film; while the temperature coefficient, defined by delta log (transmission)/delta (temperature), is negative in both cases. Dissert. Abstr.

N79-26930 Washington Univ., Seattle.
SWITCHING IN OPTICAL CHANNEL WAVEGUIDES Ph.D. Thesis
Richard Anthony Becker 1978 170 p
Avail: Univ. Microfilms Order No. 7913344

A detailed study of optical channel waveguide switches for use in a computer communications system is presented. Switches that were reported in the literature are analyzed in order to gain an understanding for the principles involved. From these principles, and the specifications demanded by the application, a new design is established. This new design is then fabricated and evaluated on LiNbO1. Many fabricational and material problems are solved in the process of developing this switch. Variations of the switch are tested experimentally and analyzed theoretically to establish the optimum design. The appendices describe some of the fabricational techniques used, including a focused laser lithographic system. The conclusion establishes the feasibility of the proposed computer communication system using the newly designed switch. Dissert. Abstr.

N79-26931# Hughes Research Labs., Malibu, Calif.
BLUE-GREEN FILTER TECHNOLOGY Final Report, 1 Feb. - 31 Dec. 1978
J. F. Lotspeich and D. M. Henderson Mar. 1979 73 p refs
(Contract N00014-78-C-0201)
(AD-A067789) Avail: NTIS HC A04/MF A01 CSCL 20/6

New concepts in wide field-of-view (approx. f/0.5), very narrow band (approx. 0.1 A) optical filters in the blue-green spectral region are sought for submarine receivers in the Navy OPSATCOM laser communication link. This program was an attempt to extend the current state of the art by exploring novel techniques that would lead to improved, useful receiver filters. Of the six general approaches investigated, two were considered principal candidates: the electrooptic iso-index coupled-wave filter, and nearly degenerate four-wave mixing. It was shown that a coupled-wave electrooptic filter exhibits a theoretical 2pi field of view (FOV) and a passband of 0.2 A at 4970 A using a 1-cm sample of AgGaS2. Tunability above and below the resonant wavelength was also shown to be feasible. The four-wave mixing approach also has a 2pi FOV and, with adequate pump power, can exhibit gain. Very narrow optical bandwidths (approx. 0.08 A) and maximum skirt rejection were demonstrated theoretically. The latter approach has the biggest potential payoff but the highest risk, while the coupled-wave EO technique is basically very simple, limited only by materials availability. Author (GRA)

N79-26932# Hughes Research Labs., Malibu, Calif.
ADVANCED MULTIDITHER COAT STUDIES Final Technical Report, 1 Jul. 1977 - 30 Jun. 1978
S. A. Kokorowski, T. R. OMeara, T. Calderone, and R. C. Lind Feb. 1979 150 p refs
(Contract F30602-77-C-0114)
(AD-A068005; RADC-TR-79-7) Avail: NTIS HC A07/MF A01 CSCL 17/8

Multidither adaptive optics systems are vulnerable to interference caused by the motion of a speckle pattern across the receiver aperture. This program investigated various techniques for reducing or canceling this interference. Several concepts were studied. A very promising one, which we call ASPECT II, was demonstrated with an experimental laboratory COAT system. Computer simulations and experimental data show that with ASPECT-II it is possible to almost completely restore speckle degraded performance of multidither COAT systems. An extensive analysis that explicitly illustrates how speckle effects interfere with COAT operations has been developed. It shows that the primary effect is to amplitude modulate the usual point source intensity distribution reflected from a target glint. With large targets, there is also an additive noise contribution from the receiver spatial intensity variations associated with reflections from the area surrounding the target focal spot. This analysis is also used to explain the operations of the ASPECT-I and ASPECT-II speckle cancellation schemes. Experimental data showing ASPECT cancellation of simulated speckle modulations is presented. The experiments show that the laboratory ASPECT system can cancel single-frequency and broadband modulations within the COAT dither band. GRA

N79-26933# Oregon Graduate Center, Beaverton.
STATISTICS OF SPECKLE PROPAGATION Final Technical Report, 1 Jan. - 30 Sep. 1978
J. Richard Kerr, Charles M. McIntyre, Myung H. Lee, and James H. Churnside Griffiss AFB, N. Y. RADC Mar. 1979 62 p refs

(Contracts F30602-78-C-0064; F30602-74-C-0082; ARPA Order 1279)
(AD-A067885; RADC-TR-79-26) Avail: NTIS HC A04/MF A01 CSCL 20/6

The objectives of this international symposium were to summarize the state of knowledge of the practical aspects of the treatment of wastewater by land application and to identify the suitable approaches for the design of such land treatment systems. Topics included in the proceedings volumes are: site selection considerations, case studies of national and international concern, health effects of land treatment systems, pretreatment considerations, uses of wastewater in agricultural and forest systems, monitoring, modeling and design criteria. Volume 1 contains 46 invited papers (presented and discussed) and Volume 2 contains 53 papers (not presented) on ongoing research. Author (GRA)

N79-26934# Fondazione Ugo Bordoni, Rome (Italy).
DESIGN METHOD FOR THE LAYOUT OF QUASI OPTICAL ELBOWS IN A CONNECTION WITH CIRCULAR WAVE GUIDES [METODO DI PROGETTO DELLA DISPOSIZIONE DEI GOMITI QUASI OTTICI IN UN COLLEGAMENTO IN GUIDA D'ONDA CIRCOLARE]
Gabriele Falciasecca (Bologne Univ.) and Raffaello Pampaloni (SIRTI, Milan) Jun. 1978 20 p refs In ITALIAN
(FUB-6-1978) Avail: NTIS HC A02/MF A01

A computer program to calculate the effect of introducing N elbows into a circular waveguide is presented. A theoretical analysis was done and a program was prepared on an HP2100 using BASIC language. Within the limit of about 15 elbows, the program is substantially valid. The special case of the double elbow is also discussed in detail. The best H values for double elbows in 50 mm guides in the band 40 to 90 GHZ are presented. Author (ESA)

N79-26935# Fondazione Ugo Bordoni, Rome (Italy).
CHARACTERIZATION OF OPTICAL FIBERS AND DESIGN CRITERIA OF COMMUNICATION SYSTEMS [CARATTERIZZAZIONE DELLE FIBRE OTTICHE E CRITERI DI PROGETTO DEI SISTEMI DI COMUNICAZIONE]
Benedetto Daino and Daniele Sette Jul. 1978 24 p refs In ITALIAN
(FUB-14-1978) Avail: NTIS HC A02/MF A01

Optical fiber properties and design criteria for communication applications are reviewed. Refraction index profile, attenuation, model dispersion, chromatic dispersion, transmitting devices, receiving devices, and maximum transmitting length are discussed. Author (ESA)

N79-26936# Fondazione Ugo Bordoni, Rome (Italy).
RADIATION EFFECTS ON OPTICAL FIBERS
Mario Bertolotti (Rome Univ.), Fernando Franceschini (CNEN Lab., Rio de Janeiro), Daniele Sette (Rome Univ.), and Antonio Serra (CNEN Lab., Casaccia) Sep. 1978 6 p refs Presented at Conf. on Opt. Propagation and Fiber Optics, Genoa 12-15 Sep. 1978
(FUB-16-1978) Avail: NTIS HC A02/MF A01

The effects of gamma rays from 60Co on some high loss commercial optical fibers were studied. Spectral transmission in the range of 4,000 to 11,000A in fibers between one and two meters long was measured before and after gamma irradiation. Doses from 100 to 6,000 rads (in air) were employed. The relative transmission of the irradiated fibers against the unirradiated fibers was measured as a function of wavelength to different gamma ray doses. Results show initial hardening and transmission loss as an effect of irradiation. Annealing experiments were also performed. Differential annealing and aging behavior for the fibers as well as patial to complete transmission recovery was found. Author (ESA)

75 PLASMA PHYSICS

Includes magnetohydrodynamics and plasma fusion. For ionospheric plasmas see *46 Geophysics*. For space plasmas see *90 Astrophysics*.

N79-26937 California Univ., Los Angeles.
STIMULATED BRILLOUIN SIDESCATTER AND BACKSCATTER OF CARBON DIOXIDE LASER RADIATION FROM A LASER ALTERED ARC PLASMA Ph.D. Thesis
Mark Joseph Herbst 1979 102 p
Avail: Univ. Microfilms Order No. 7913729

Using a 30 Joule, 50 nanosecond FWHM CO2 laser pulse, hydrogen plasmas with densities as high as 10 to the 18th power/cu cm are formed by the laser in gas preionized by a pulsed, high-current arc. Brillouin sidescatter and backscatter are identified, and a dependence of the properties of the scattered light upon the level of arc preionization is observed. Evidence is found for laser-induced plasma motion and for self-focusing of the beam by the plasma. Observed scattering levels are compared with theoretical prediction, as are relative levels of sidescatter and backscatter; in determining the latter, an observed lack of dependence of sidescatter level on incident laser polarization must be taken into account. Finally, in an attempt to establish whether previously observed spikiness in Brillouin backscatter is due to mode-beating in the pump, Brillouin scattering of a smoothed CO2 input is studied. Dissert. Abstr.

N79-26938 Illinois Univ. at Urbana-Champaign.
HARMONIC GENERATION AND PARAMETRIC EXCITATION IN A BEAM-PLASMA SYSTEM Ph.D. Thesis
Ronald Albert Kerst 1978 167 p
Avail: Univ. Microfilms Order No. 7913509

Harmonic generation by wave-wave and wave-particle interactions and parametric excitation of plasma and ion-acoustic waves by a beam-plasma instability are studied, theoretically and experimentally, in a cold beam-plasma system. The dispersion relations for plasma and ion-acoustic waves are calculated. Coupling constants for harmonic generation and parametric excitation are calculated and the equations for the wave amplitudes are solved numerically for some important cases. Measurements are made of fundamental and harmonic wave intensities. Two distinct harmonic generation mechanisms are identified and attributed to wave-wave and wave-particle interactions. Measurements are made of sideband excitation by a beam-plasma instability. Connection of the sideband production with ion dynamics is established. The sideband excitation mechanism is identified as a parametric instability, and good agreement with theory is found. Dissert. Abstr.

N79-26939 Illinois Univ. at Urbana-Champaign.
EFFECTS OF SUPRATHERMAL FUSION PARTICLES IN TOKAMAK PLASMAS Ph.D. Thesis
Thomas Walter Petrie 1978 156 p
Avail: Univ. Microfilms Order No. 7913575

Several crucial properties of suprathermal (> 500 keV) fusion-products are explored, both in their initial phase and during their slowing-down period. A guiding center drift theory, which predicts the effect of energy loss on the motion of these suprathermals, is derived for a low-beta, symmetric (non-ripple) Tokamak. Velocity-space scattering is ignored. Among the important implications of this theory are: (1) the net inward drift of fusion particles during their slow-down phase, and (2) the importance of the plasma density and temperature in determining this drift. Either of two computer codes, SYMALF or RIPALF, can be used to calculate the net spatial charge build-up arising from rapid fusion particle losses. A fluid model which incorporates this information is developed to predict toroidal plasma rotation induced by these losses. Dissert. Abstr.

N79-26940 California Univ., Davis.
STABILITY OF THE CRITICAL SURFACE IN THE PRESENCE OF STRONG ELECTROMAGNETIC RADIATION Ph.D. Thesis
Wee-Yong Woo 1978 157 p
Avail: Univ. Microfilms Order No. 7912985

The stability of the critical surface of a semi-infinite plasma supported by strong incoming light was investigated theoretically with one and two dimensional computer fluid calculations for s- and p-polarized light. The instabilities are mainly oscillating two stream type with both Stokes and anti-Stokes components being excited. The self-consistency of the high frequency field structure and the plasma density profile is treated by combining

the pump size and the length of density gradients as one dependent parameter, and hence the thresholds obtained do not vary as 1/k as predicted previously. Dissert. Abstr.

N79-26941 California Univ., Davis.
EXPERIMENTAL OBSERVATION OF STRONG PROFILE MODIFICATION OF AN INHOMOGENEOUS PLASMA DUE TO INTENSE MICROWAVES Ph.D. Thesis
Rick Bernard Spielman 1978 91 p
Avail: Univ. Microfilms Order No. 7912977

The interaction of intense microwaves with inhomogeneous plasma was studied using measurements obtained in the U. C. Davis PROMETHEUS device which models laser absorption and heat transport in a spherical segment of a laser driven fusion pellet. The plasma density profile as a function of time (during the microwave pulse), microwave power, and plasma flow velocity was determined. The plasma density profile is strongly modified even for rather low microwave power. High frequency waves exert a low frequency force on the plasma (the ponderomotive force). If the pressure due to the high frequency waves is comparable to the plasma pressure, the density profile will be significantly modified. For supersonic plasma flow through the critical surface, overdense bumps grow in the underdense region of the density profile after the microwaves are turned on. These profiles are not stable but break up into strong low frequency turbulence. Dissert. Abstr.

N79-26942*# Stanford Univ., Calif. Inst. for Plasma Research.
A FLUID DESCRIPTION OF PLASMA DOUBLE-LAYERS
J. S. Levine and F. W. Crawford May 1979 45 p refs
(Grants NGL-05-020-176; NSF ATM-78-08440)
(NASA-CR-158719; SU-IPR-787) Avail: NTIS HC A03/MF A01 CSCL 20I

The space-charge double-layer that forms between two plasmas with different densities and thermal energies was investigated using three progressively realistic models which are treated by fluid theory, and take into account four species of particles: electrons and ions reflected by the double-layer, and electrons and ions transmitted through it. The two plasmas are assumed to be cold, and the self-consistent potential, electric field and space-charge distributions within the double-layer are determined. The effects of thermal velocities are taken into account for the reflected particles, and the modifications to the cold plasma solutions are established. Further modifications due to thermal velocities of the transmitted particles are examined. The applicability of a one dimensional fluid description, rather than plasma kinetic theory, is discussed. Theoretical predictions are compared with double layer potentials and lengths deduced from laboratory and space plasma experiments. A.R.H.

N79-26943*# Colorado State Univ., Fort Collins. Dept. of Physics.
PHYSICAL PROCESSES IN DIRECTED ION BEAM SPUTTERING Ph.D. Thesis
Raymond S. Robinson Mar. 1979 153 p refs
(Grant NsG-3086)
(NASA-CR-159567) Avail: NTIS HC A08/MF A01 CSCL 20i

The general operation of a discharge chamber for the production of ions is described. A model is presented for the magnetic containment of both primary and secondary or Maxwellian electrons in the discharge plasma. Cross sections were calculated for energy and momentum transfer in binary collisions between like pairs of Ar, Kr, and Xe atoms in the energy range from about 1 eV to 1000 eV. These calculations were made from available pair interaction potentials using a classical model. Experimental data from the literature were fit to a theoretical expression for the Ar resonance charge exchange cross section over the same energy range. A model was developed that describes the processes of conical texturing of a surface due to simultaneous directed ion beam etching and sputter deposition of an impurity material. This model accurately predicts both a minimum temperature for texturing to take place and the variation of cone density with temperature. It also provides the correct order of magnitude of cone separation. It was predicted from the model, and subsequently verified experimentally, that a high sputter yield material could serve as a seed for coning of a lower sputter yield substrate. Seeding geometries and seed deposition rates were studied to obtain an important input to the theoretical texturing model. A.R.H.

N79-26944# Naval Research Lab., Washington, D. C.
COLLECTIVE RADIO-EMISSION FROM PLASMAS Interim Report
K. Papadopoulos and H. P. Freund 7 Feb. 1979 112 p refs
(AD-A066923; AD-E000277; NRL-MR-3922) Avail: NTIS HC A06/MF A01 CSCL 20/9

Collective radiation processes operating in laboratory and space plasmas are reviewed with an emphasis towards astrophysical applications. Particular stress is placed on the physics involved in the various processes rather than in the detailed derivation of the formulas. Radiation processes from stable non-thermal, weakly turbulent and strongly turbulent magnetized and unmagnetized plasmas are discussed. The general theoretical ideas involved in amplification processes such as stimulated scattering are presented along with their application to free electron and plasma lasers. Direct radio-emission of electromagnetic waves by linear instabilities driven by beams or velocity anisotropies are shown to be of relevance in space applications. Finally, as an example of the computational state of the art pertaining to plasma radiation, a study of the type III solar radio bursts is presented.
Author (GRA)

N79-26945# Los Alamos Scientific Lab., N. Mex.
MATERIALS PROBLEMS WITH INERTIAL CONFINEMENT FUSION TARGETS
Eugene H. Farnum, R. J. Fries, and James E. Barefield, II 1979 10 p refs Presented at 1st Topical Meeting on Fusion Reactor Mater., Miami Beach, Fla., 29-31 Jan. 1979
(Contract W-7405-eng-36)
(LA-UR-79-76; Conf-790125-7) Avail: NTIS HC A02/MF A01

Gold and tungsten were investigated for use as inner, high-Z shells, and as yet unsolved problems were encountered with both materials. Pure electroplated gold lacks sufficient tensile strength to be useful by itself and in addition became porous foam when heated to 923 K in hydrogen. Tungsten, which can be deposited by chemical reduction of WF6, does not show substantial morphological changes on exposure to hot hydrogen, but exhibits extremely low permeability to hydrogen in coatings thicker than 25 microns. This low permeability limits the maximum achievable fuel content to an amount that can be contained by a shell with wall thickness <or = 25 microns. DOE

N79-26946# General Atomic Co., San Diego, Calif.
DOUBLET DEMONSTRATION FUSION POWER REACTOR STUDY
Jul. 1978 281 p refs
(Contract EY-76-C-03-0167)
(GA-A-14742) Avail: NTIS HC A13/MF A01

Reactor characteristics and the general arrangement are examined, and emphasis is given to those reactor systems that are most influenced by the doublet configuration. A reactor technical and economic systems analysis was conducted over a wide range of power output and reactor parameters. The integrated performance and design of the blanket-field shaping coil/plasma subsystems, and an overall reactor maintenance scenario were examined. The reactor has a 5.34 m major radius and a net electrical output of 307 MW(e). The blanket incorporates Li7Pb2 for breeding, a high nickel base alloy structure, and is helium cooled. The magnet systems consist of superconducting toroidal and ohmic heating coils, and normal copper field-shaping coils. The nine toroidal coils have a maximum field of 8.8 T. The plasma is heated by up to 80 MW of lower hybrid rf power. The reactor arrangement is strongly influenced by remote maintenance requirements and a two stage vacuum zone approach. DOE

N79-26947# Princeton Univ., N. J. Plasma Physics Lab.
SLPX: SUPERCONDUCTING LONG-PULSE TOKAMAK EXPERIMENT
D. L. Jassby, J. File, G. Bronner, J. R. Clarke, H. G. Johnson, G. D. Martin, J. G. Murray, M. Okabayashi, W. G. Price, Jr., P. Rogoff et al 25 Sep. 1978 8 p refs Presented at Applied Superconductivity Conf., Pittsburgh, 25-28 Sep. 1978

(Contract EY-76-C-02-3073)
(PPPL-1488; Conf-780952-21) Avail: NTIS HC A02/MF A01

The status of the engineering design features of the SLPX is discussed with emphasis on the magnetics systems. The toroidal-field coils have an aperture of 3.1 x 4.8 m and can operate with a maximum field at the conductor of 12 T. The superconducting poloidal field magnetics system consists of a pulsed NbTi central solenoid and a set of dc NbTi equilibrium-field coils. The entire machine is enclosed in an outer vacuum container equipped with reentrant ports that provide ambient access to the room-temperature plasma vessel. DOE

N79-26948# California Univ., Livermore. Lawrence Livermore Lab.
ATOMIC REACTION RATES IN H(-) AND D(-) PLASMAS
J. R. Hiskes, M. Bacal, and G. W. Hamilton 18 Jan. 1979 23 p refs
(Contract W-7405-eng-48)
(UCID-18031) Avail: NTIS HC A02/MF A01

The processes leading to negative ion production in a hydrogen plasma are reviewed. Dissociative attachment of electrons to highly excited vibrational states of hydrogen molecules appears to be the most probable source of negative ions. The possibility of significant negative ion production via dissociative recombination of H3(+) with electrons cannot be excluded. The survival probability of vibrationally excited hydrogen molecules in wall collisions may be a critical parameter in interpreting the data. DOE

N79-26949# California Univ., Livermore. Lawrence Livermore Lab.
LASER FUSION DIAGNOSTICS
Lamar W. Coleman 16 Aug. 1978 34 p refs Revised
(Contract W-7405-eng-48)
(UCRL-81099-Rev-1) Avail: NTIS HC A03/MF A01

High temporal and spatial resolution optical diagnostics of laser performance, energy balance, and applicable plasma probing techniques are reviewed. A variety of spatially, temporally and spectrally resolved X-ray diagnostics techniques and instruments are discussed. Particular emphasis is on high spatial resolution imaging techniques and applications and on high temporal resolution X-ray streak camera applications to exploding pusher target experiments. Finally, particle diagnostics and systems designed to diagnose target performance via yield and temperature measurements and techniques designed to determine the characteristics of compressed targets are discussed. DOE

N79-26950# California Univ., Livermore. Lawrence Livermore Lab.
LASER FUSION: STATUS, FUTURE, AND TRITIUM CONTROL
Philip E. Coyle Nov. 1978 22 p Presented at Symp. on the Behavior of Tritium in the Environment, San Francisco, Calif., 16-20 Oct. 1978
(Contract W-7405-eng-48)
(UCRL-81946; Conf-781029-8) Avail: NTIS HC A02/MF A01

The 10 kJ, 20 to 30 TW Shiva facility is now operational and producing regular new fusion results. Design work was begun on a 200 to 300 TW laser designed to carry the program through the first breakeven demonstration experiments in the mid-1980's. Confidence in reaching this goal is based on the significant progress made in state-of-the-art, high-power Nd:glass laser technology, in experimental laser fusion and laser plasma interaction physics, and in theoretical and analytical computer codes which reliably model and predict experimental results. For all of these experiments, a variety of fusion targets are being fabricated in the laboratory, and the control and handling of tritium is now a regular and routine part of ongoing inertial fusion experiments. Target design with gains of about 1000 was studied and the means to mass produce such pellets at low cost are also being developed. DOE

N79-26951# Brookhaven National Lab., Upton, N. Y.
NEGATIVE ION BASED NEUTRAL BEAMS FOR PLASMA HEATING
K. Prelec 1978 19 p refs Presented at 9th Symp. on the Phys. of Ionized Gases, Dubrovnik, Yugoslavia, 28 Aug. 1978
(Contract EY-76-C-02-0016)
(BNL-24782; Conf-780851-3) Avail: NTIS HC A02/MF A01

Neutral beam systems based on negative ions are considered because of a high expected power efficiency. Methods for the production, acceleration and neutralization of negative ions will be reviewed and possibilities for an application in neutral beam lines explored. DOE

N79-26952# Department of Energy, Washington, D. C.
DEPARTMENT OF ENERGY POLICY FOR FUSION ENERGY
J. M. Deutch Sep. 1978 29 p
(DOE/ER-0018) Avail: NTIS HC A03/MF A01

The magnetic and inertial fusion research program objectives are described. The various phases of the program are outlined. Author (DOE)

N79-26953# Argonne National Lab., Ill.
FUSION POWER PROGRAM Quarterly Progress Report, Apr. - Jun. 1978
C. C. Baker, J. B. Darby, Jr., and S. D. Harkness 1978 108 p refs
(Contract W-31-109-eng-38)
(ANL/FPP-78-2) Avail: NTIS HC A06/MF A01

Abstracts and/or results are presented for investigations in the following research and development areas: reactor materials; energy storage and transfer; tritium containment, recovery and control; advanced reactor design; system studies; neutronics; atomic data; reactor safety; superconducting magnet coils; and other work related to fusion power. Fifty-seven documents by project personnel are also listed. DOE

N79-26954# Oak Ridge National Lab., Tenn.
RESISTIVE BALLOONING MODE EQUATION
G. Bateman and D. B. Nelson Oct. 1978 17 p refs
(Contract W-7405-eng-26)
(ORNL-TM-6629) Avail: NTIS HC A02/MF A01

A second-order ordinary differential equation on each flux surface is derived for the high mode number limit of resistive MHD ballooning modes in Tokamaks with arbitrary cross section, aspect ratio, and shear. The equation is structurally similar to that used to study ideal MHD ballooning modes computationally. The model indicates that all Tokamak plasmas are unstable, with growth rate proportional to resistivity when the pressure gradient is less than the critical value needed for ideal MHD stability. DOE

N79-26955# Oak Ridge National Lab., Tenn.
NUMERICAL SOFTWARE SUPPORT FOR THE FUSION ENERGY PROGRAM AT OAK RIDGE
P. W. Gaffney 1978 14 p refs Presented at the 2d Workshop on Operational Aspects of Math. Software Libraries at Lawrence Livermore Lab., Livermore, Calif., 31 Jul. 1978
(Contract W-7405-eng-26)
(CONF-780763-1) Avail: NTIS HC A02/MF A01

The two main subroutine libraries used by the computer science group are the numerical algorithms group library and The Harwell subroutine library. A list of the software obtained for use at ORNL is given. DOE

N79-26956# California Univ., Livermore. Lawrence Livermore Lab.
PLASMA NEUTRON DIAGNOSTIC TECHNIQUES WITH GOOD SPATIAL AND ENERGY RESOLUTION
D. R. Slaughter 15 Sep. 1978 9 p refs Presented at the IEEE Nucl. Sci. Symp., Washington, D. C., 18 Oct. 1978
(Contract W-7405-eng-48)
(UCRL-81120; Conf-781033-21) Avail: NTIS HC A02/MF A01

A neutron detection system was assembled to provide both spatial and energy information from the neutrons produced in advanced fusion experiments. Techniques described are applicable to experiments where the neutron pulse is on the order of one second duration. The system gives spatial resolution of about 1 cm at distances of 1 to 2 m and energy resolution of 0.6 MeV at 14 MeV. In all cases, pulse-shape discrimination is used to distinguish neutrons from gamma rays. DOE

N79-26957# Illinois Univ., Urbana. Fusion Studies Lab.
ALPHA HEATING IN TOROIDAL DEVICES
George H. Miley 1978 7 p refs Presented at 10th Symp. on Fusion Technol., Padova, Italy, 4 Sep. 1978
(Contract EY-76-S-02-2218)
(COO-2218-123; Conf-780953-9) Avail: NTIS HC A02/MF A01

Ignition (or near-ignition) by alpha heating is a key objective for the achievement of economic fusion reactors. While good confinement of high-energy alphas appears possible in larger reactors, near-term Tokamak-type ignition experiments as well as some concepts for small reactors (e.g., the Field-Reversed Mirror or FRM) potentially face marginal situations. Consequently, there is a strong motivation to develop methods to evaluate alpha losses and heating profiles in some detail. Such studies for a TFTR-size Tokamak and for a small FRM are described. DOE

N79-26958# California Univ., Los Angeles. Dept. of Physics.
ANALYTICAL THEORY OF DRIFT WAVES AND DRIFT ALFVEN WAVES IN TOKAMAKS
Y. C. Lee and L. Chen Jan. 1979 17 p refs Prepared in cooperation with Princeton Univ., N. J.
(Contracts EY-76-C-02-3073; EY-76-S-03-0034; W-7405-eng-48; Grant NSF PHY-77-12873)
(PPPL-1512) Avail: NTIS HC A02/MF A01

The collisionless drift wave and drift Alfven wave instabilities in a sheared magnetic field are considered using a complex transformation technique. It is shown that no unstable bounded eigensolutions for the finite Beta radial eigenmode equations exist. A more general technique is presented based on the wave-flux conservation and find, furthermore, that the convective amplification of drift waves in the electrostatic limit can be anomalously large, which could lead to enhanced transport in Tokamaks. DOE

N79-26959# California Univ., Berkeley. Lawrence Berkeley Lab.
TEMPERATURE MEASUREMENTS IN THE TORMAC 4-C PLASMA Ph.D. Thesis
Martin Greenwald Sep. 1978 154 p refs
(Contract W-7405-eng-48)
(LBL-8166) Avail: NTIS HC A08/MF A01

The thesis is divided into four main parts. The first is an introduction to the Tormac concept and a brief summary of the theoretical problems involved. The second part describes the experimental work with little detail. Both the construction and diagnostics are summarized. The third section is broken into two parts, a summary of the data taken on TORMAC 4-cent and a explanation and discussion of the data. Finally, a number of lengthy appendices are included. These detail the construction and operation of the device and describe the principles and practice of the diagnostics employed. DOE

N79-26960# Argonne National Lab., Ill.
STABILITY CALCULATIONS FOR MHD MAGNETS
L. R. Turner, S. T. Wang, and J. Harrang 1978 9 p refs Presented at Superconducting MHD Magnet Design Conf., Cambridge, Mass., 18-19 Oct. 1978
(Contract W-31-109-eng-38)
(CONF-781055-4) Avail: NTIS HC A02/MF A01

When a cryostable composite conductor carrying current experiences a heat input from a mechanical perturbation, a normal region develops which initially propagates and then either collapses or continues to propagate. A computer model, devised to study this phenomenon, incorporates initial or continuing heat input from mechanical perturbations, heat conducted to the neighboring elements of the conductor and, if appropriate, heat conducted through insulation to neighboring turns. Heat is transferred to the helium coolant according to a specified heat transfer coefficient. If the element of conductor is in a normal or current sharing state, resistive heating also occurs. The (unstable) equilibrium state of heat generation and conduction was studied; results agree with those of a static calculation. The model was validated against experimental measurements of response to heat pulses. DOE

N79-26961# Stuttgart Univ. (West Germany). Inst. fuer Plasmaforschung.
BASIC PHYSICAL PHENOMENA NEUTRON PRODUCTION AND SCALING OF THE DENSE PLASMA FOCUS
H. J. Kaeppeler 1977 25 p refs
(IPF-77-7) Avail: NTIS HC A02/MF A01

A model theory for dense plasma focus including a consistent interpretation of the basic physical phenomena leading to neutron production from both acceleration and thermal processes is presented. The temporal history of the focus is divided into the compression of the plasma sheath, a quiescent and very dense phase with ensuing expansion, and an instable phase where the focus plasma is disrupted by instabilities. The decay of density, velocity, and thermal fields is also considered. Under the assumption that I exponent 2 sub 0/rho sub o R exponent 2 sub O = const and t sub o/t sub c = const, scaling laws for plasma focus devices are derived. Results show that while generally the neutron yield scales with the fourth power of maximum current, neutron production from thermal processes becomes increasingly important for large devices, while in the small devices neutron production from acceleration processes is by far predominant. Author (ESA)

76 SOLID-STATE PHYSICS

Includes superconductivity.

For related information, see also *33 Electronics and Electrical Engineering* and *36 Lasers and Masers*.

N79-26962 Illinois Univ. at Urbana-Champaign, Urbana.
UPPER CRITICAL MAGNETIC FIELD OF SUPERCONDUCTING FILMS WITH MAGNETIC IMPURITIES Ph.D. Thesis
Thomas Richard Lemberger 1978 165 p
Avail: Univ. Microfilms Order No. 7913530

The resistance of In-Mn and Pb-Mn alloys films was used to determine the upper critical magnetic field of these semiconductors. The measurements obtained were compared with the theory of Fulde and Maki which predicts that the pair-breaking effects of the magnetic impurities is temperature-independent, and that the pair-breaking effects of the magnetic impurities and the applied magnetic field are additive. Furthermore, it predicts explicitly the temperature dependence of H sub c2. The temperature dependence of H sub c2 for the In-Mn alloy films is well described by the Fulde-Maki theory, despite the moderately strong electron-phonon coupling and the strong interaction between the impurity spins and the conduction electron spins. The temperature dependence of H sub c2 for the Pb-Mn alloys films is not well described by the Fulde-Maki theory, probably due to the strong electron-phonon coupling in Pb. Dissert. Abstr.

N79-26963 Illinois Univ. at Urbana-Champaign, Urbana.
CATALYSIS BY TRANSITION METAL COMPOUNDS Ph.D. Thesis
David Lee Klein 1978 154 p
Avail: Univ. Microfilms Order No. 7913514

The catalytic properties of cobalt oxide were investigated theoretically. The interactions of atomic hydrogen with small clusters of atoms, representing cobalt oxide surfaces, were calculated using the ab initio unrestricted Hartree-Fock method. The electronic structure of the bulk solid was studied through band and cluster models. The bulk electronic structure computed predicts insulating behavior for cobalt oxide and agrees with experimental optical results. The perfect (100) cobalt oxide surface was determined not to chemisorb atomic hydrogen. Singly-ionized oxygen ions located near cation vacancies were found to chemisorb hydrogen, forming two-center covalent bonds. The effect of lattice defects on the creation of singly-ionized oxygen ions was examined. A systematic procedure for the study of surface and bulk electronic properties is discussed. Dissert. Abstr.

N79-26964 Georgia Univ., Athens.
BAND AND POLARIZATION CALCULATIONS FOR FERROELECTRIC AND PIEZOELECTRIC CRYSTALS Ph.D. Thesis
Kim-Shing Kam 1978 98 p
Avail: Univ. Microfilms Order No. 7914036

The electronic band structures of ferroelectric NaNO2

(orthorhombic phase), LiNbO3 (rhombohedral phase), and KNbO3 (tetragonal phase) were calculated using a Plane-Wave-Gaussian (PWG) mixed basis set and an X sub alpha exchange. The electronic charge density obtained from the band calculations was used to calculate the spontaneous polarization using the assumption that the boundaries of a neutral unit cell are represented by minimum surface contours of the electronic charge density. The piezoelectric constants of ferroelectric NaNO2 were calculated using the assumption that the displacements of atoms in a strained crystal are directly proportional to the strains. The calculated values of the spontaneous polarization are given.
Dissert. Abstr.

N79-26965 Illinois Univ. at Urbana-Champaign, Urbana.
ULTRASONIC STUDIES OF RADIATION DAMAGE IN AN ALUMINUM-MANGANESE ALLOY Ph.D. Thesis
David Leroy Johnson 1978 92 p
Avail: Univ. Microfilms Order No. 7913505

The MHz internal friction technique was shown to provide accurate measurements of the properties of defects produced by a low dose of electron radiation. In spite of the optimum conditions for avoiding complications due to multiple interstitial and multiple solute atom complexes, the multiple peak structure of the data indicated that more than one defect configuration was present. This is in direct contrast with channeling measurements and the interpretation of Mossbauer effect measurements which indicated the defect trapping configuration with the < 100 > mixed dumbbell. Neither of the two existing models used in the interpretation of other experiments was capable of explaining the data. However, a third model incorporating the features of both is capable of accounting for the observed behavior.
Dissert. Abstr.

N79-26966 Illinois Univ. at Urbana-Champaign.
THIN-SOURCE CONCENTRATION DEPENDENT DIFFUSION Ph.D. Thesis
Genghmun Eng 1978 382 p
Avail: Univ. Microfilms Order No. 7913446

The diffusion of calcium cations in NaCl was measured for various diffusion times and for the temperature range (575 C - 775 C), using a thin-source of Ca-45 tracer, rectangular geometry, and serial sectioning. A solution for CA concentration dependent diffusivity process, was found by using an experiment where two different samples with identical surface impurity concentrations were diffused for different times at the same temperature. A data analysis procedure was developed which rigorously conserves total diffusant amount and allows an arbitrary function as an initial state, thus permitting the propagation from a measured initial state, to a given final state. High and lower temperature functions are discussed.
Dissert. Abstr.

N79-26967 Illinois Univ. at Urbana-Champaign, Urbana.
SURFACE STUDIES OF GROUP IV-VI LAYERED CRYSTALS Ph.D. Thesis
Walter Fabian 1978 97 p
Avail: Univ. Microfilms Order No. 7913448

The surface structure of TiSe2 was investigated by low energy electron diffraction (LEED). No surface reconstruction was observed and comparison of LEED intensity data with theory suggests a slight outward relaxation of atomic planes at the surface. The LEED pattern for a crystal cleaved at a temperature below the charge density wave transition exhibited a 2a sub zero x 2a sub zero surface superlattice. The electronic band structures for TiSe2 and TiS2 were investigated by angle resolved photoemission spectroscopy. Excitation is provided by He I and He II ultraviolet radiation. TiSe2 is a semimetal with a band overlap of less than 0.25 eV, while TiSe2 is a semiconductor. These measured bands are in good agreement with recent theoretical band calculations.
Dissert. Abstr.

N79-26968 Illinois Univ. at Urbana-Champaign, Urbana.
SPECIFIC HEAT OF SUPERCONDUCTING FILMS OF INDIUM AND OF INDIUM ALLOYED WITH MAGNETIC IMPURITIES Ph.D. Thesis
Brain Charles Gibson 1978 134 p
Avail: Univ. Microfilms Order No. 7913470

The discontinuity (delta c) in the specific heat at the superconducting transition for quench-condensed films of indium, indium-manganese, and indium-chromium was measured. Magnetic impurities depress the superconducting transition temperature and predictions based on the Shiba theory for classical spins in superconductors indicate that (delta c) is also depressed by the presence of magnetic impurities. The Shiba theory indicates that delta c is depressed more rapidly than the superconducting transition temperature as magnetic impurities are introduced into a superconductor. Results confirm this prediction, but show an even greater depression than the Shiba theory predicts. For pure indium, delta c increases with increasing disorder, where the degree of disorder is indicated by the residual resistivity of the sample. Increases occur roughly ten times more rapidly with the degree of disorder than would be estimated from the results of Bergmann.
Dissert. Abstr.

N79-26969 New York Univ., N. Y.
RENORMALIZATION GROUP TRANSFORMATIONS FOR 7-SPIN TRIANGULAR LATTICE Ph.D. Thesis
Pongtig Winotai 1978 108 p
Avail: Univ. Microfilms Order No. 7912321

Transformations for a 7-spin triangular lattice were solved up to the third order of the cumulant expansion. In the calculation, four different spin definitions were used to obtain the transformations. The results show the variations of the critical exponents with these definitions. The best results were obtained from the 3-spin majority rule in the first order where alpha = .00605, beta = .11821, gamma = 1.75752, delta = 15.86770 and nu = .99679. The results from the 7-spin majority rule are less accurate but still acceptable. In this case, alpha - .03489, beta = .10902, gamma = 1.74706, delta = 17.02440 and nu = .98256. Rushbrooke inequality is satisfied by both sets of data.
Dissert. Abstr.

N79-26970 Rensselaer Polytechnic Inst., Troy, N. Y.
MATHEMATICAL PROGRAMMING SOLUTION TO THE PHASE PROBLEM OF CRYSTALLOGRAPHY Ph.D. Thesis
William Albert Thompson 1978 252 p
Avail: Univ. Microfilms Order No. 7913087

The phase problem of X-ray Crystallography was formulated as a mathematical programming problem. By dividing the unit cell into a fixed finite grid of possible positions, it is possible to linearize the trigonometric parts of the structure factor in such a way that the phase problem can be attacked by linear and quadratic programming methods. Several direct space formulations of the phase problem are presented and computational results are presented for linear programming formulations using a modified linear programming code. Results of a heuristic concave quadratic programming algorithm are also presented. Results of an integer programming formulation of the crystal structure refinement problem are presented.
Dissert. Abstr.

N79-26971 Illinois Univ. at Urbana-Champaign.
SUPERLATTICE FORMATION IN GROUP 4-B TRANSITION METAL DICHALCOGENIDES Ph.D. Thesis
Ka-Chiu Eddie Woo 1978 86 p
Avail: Univ. Microfilms Order No. 7913664

Electron diffraction studies show that a 2a subzero x 2c subzero superlattice forms in TiSe2 at low temperature. Strong diffuse scattering is observed above T sub C. An optically active far infrared lattice mode is observed which breaks up into several additional modes below the phase transition. In the infrared study, there is a shift in the Drude edge as well as new absorption peaks at low temperature. These observed phenomena are related to the energy gap which opens up in the band structure below the phase transition temperature. Strong diffuse scattering, which persists down to 100K, is seen in TiS2 and HfTe2. No structural transition is observed in these crystals, but the diffuse scattering can be a precursor to superlattice formation.
Dissert. Abstr.

N79-26972 Duke Univ., Durham, N. C.
NMR OF DILUTE ORTHO-H(SUB)2 IMPURITIES IN SOLID PARA-H(SUB) 2 AT TEMPERATURES BELOW 1K Ph.D. Thesis
Rudolph Conrad Schweizer 1978 171 p
Avail: Univ. Microfilms Order No. 7912799

Nuclear magnetic resonance experiments were performed on single crystal samples of solid hydrogen with ortho concentration less than 5% at temperatures down to .025K. For hydrogen in

this concentration range, the NMR signal comes primarily from three sources: isolated ortho molecules, isolated ortho pairs, and HD molecules present as an impurity. Evidence of a surprising amount of motion of the molecules was seen in the time dependence of the spectra. The clustering time decreased from approximately 10 hrs at 0.2K to approximately 2 hrs at 0.05K. The signal from the HD molecules was almost an order of magnitude sharper than would be predicted from intermolecular dipolar broadening. The signal was shifted by approximately 20ppm to a frequency lower than the Larmor frequency for ortho-H2. These two effects lead to speculation about those molecules being in a state of collective motion with a high diffusion coefficient. Dissert. Abstr.

N79-26973 California Univ., Irvine.
SOME APPLICATIONS OF GREEN'S FUNCTIONS TO THE STUDY OF THE EFFECTS OF SURFACES ON THE DYNAMICAL PROPERTIES OF ELASTIC SOLIDS Ph.D. Thesis
Kevin Glenn Portz 1979 151 p
Avail: Univ. Microfilms Order No. 7913966

Elasticity theory is used to determine the surface contribution to the low-temperature specific heat of a semi-infinite cubic crystal bounded by a (001) stress-free surface. The equations obtained were solved analytically, and the necessary integrals evaluated numerically for a range of values of the elastic moduli of the medium. The dynamical Green's functions for an isotropic elastic slab with stress-free surfaces were determined, together with their static limits. The latter Green's functions were used to obtain the mean-square displacements of points in this elastic continuum in the high temperature limit. Second harmonic generation of Rayleigh waves was studied. The amplitude of the second harmonic is found to vary as the square of the amplitude of the original Rayleigh wave. The efficiency of second harmonic generation is calculated. Dissert. Abstr.

N79-26974 Illinois Univ. at Urbana-Champaign, Urbana.
CRYSTAL GROWTH AND ELECTRICAL PROPERTIES OF SPUTTERED INDIUM GALLIUM ANTIMONIDE THIN FILMS Ph.D. Thesis
Atef Helmy Eltoukhy 1978 191 p
Avail: Univ. Microfilms Order No. 7913445

The growth of single crystal InGaSb alloys and InSb/GaSb superlattice structures by separate-plasma multitarget sputtering was investigated. The composition, structure, and electrical properties of the alloys as well as the compositional modulation, interface abruptness, and structure of the superlattices were related to film growth variables in order to develop a better understanding of crystal growth by sputtering. Topics discussed include: (1) the effects of energetic ion and charge-exchanged neutral atom bombardment on preferential elemental sputtering and enhanced diffusion at the target as well as at the growing film; (2) the concentration and ionization energies of defect levels in sputtered GaSb and In sub x Ga sub 1-x Sb films; (3) ion bombardment enhanced diffusion; and (4) film crystallinity and defect structures in both the alloy and superlattice films grown on a variety of substrates including: (100) and (111) Ga GaAs, cleaved (111) BaF2 and (100) NaCl, and Corning 7059 glass slides. Dissert. Abstr.

N79-26975 Illinois Univ. at Urbana-Champaign.
STUDIES OF HIGH-DOSE ION IMPLANTATION IN SILICON Ph.D. Thesis
Mon Yen Tsai 1978 141 p
Avail: Univ. Microfilms Order No. 7913642

Properties of high-dose BF2(+), Si(+) + (B(+), and Ga(+) implanted Si obtained by differential resistivity and Hall effect measurements, secondary ion mass spectrometry, deep-level transient spectroscopy, and Auger electron spectroscopy are discussed. Carbonaceous surface contamination layers up to approximately 100 A thick were observed. Such layers inhibit etching and interfere with ohmic contact formation. No simple methods were found to remove the layer without stripping a thin Si surface layer. However, by using perfluorinated polyether diffusion pump oil in the implanted target chamber vacuum system, the contamination layer can be effectively eliminated. Dissert. Abstr.

N79-26976 Stanford Univ., Calif.
DOPING PROCESS IN SILICON EPITAXY: TRANSFER FUNCTION AND PHYSICOCHEMICAL MODEL Ph.D. Thesis
Rafael Leo Reif 1979 124 p
Avail: Univ. Microfilms Order No. 7912403

The doping process in a horizontal silicon epitaxial reactor is characterized by a mathematical expression that relates the dopant gas flow into the reactor as a function of time to the dopant concentration in the epitaxial layer as a function of depth. This transfer function is obtained from the response of the reactor to step changes in the dopant gas flow and is verified by experiments in which flow follows a more complicated time dependence. A physicochemical model that describes the incorporation of dopant atoms into growing silicon epitaxial films is introduced. It takes into account gas-phase transport dynamics in addition to such surface reactions as adsorption, surface migration, site incorporation, and desorption, and describes the doping process under both time-independent and time-dependent operating conditions. It is also used to derive the transfer function of the doping process. The behavior of the epitaxial reactor predicted by the model under different operating conditions is described and compared to experimental results. Dissert. Abstr.

N79-26977*# Battelle Columbus Labs., Ohio.
EVALUATION OF SELECTED CHEMICAL PROCESSES FOR PRODUCTION OF LOW-COST SILICON, PHASE 3 Quarterly Progress Report, 1 Jan. - 31 Mar. 1979
J. M. Blocher, Jr. and M. F. Browning 30 May 1979 23 p Prepared for JPL and DOE
(Contracts NAS7-100; JPL-954339)
(NASA-CR-158739; DOE/JPL-954339-79/14) QPR-14; Avail: NTIS HC A02/MF A01 CSCL 20B

The construction of the 50 MT Si/year experimental process system development unit was deferred until FY 1980, and the fluidized bed, zinc vaporizer, by-product condenser, and electrolytic cell were combined with auxiliary units, capable of supporting 8-hour batchwise operation, to form the process development unit (PDU), which is scheduled to be in operation by October 1, 1979. The design of the PDU and objectives of its operation are discussed. Experimental program support activities described relate to: (1) a wetted-wall condensor; (2) fluidized-bed modeling; (3) zinc chloride electrolysis; and (4) zinc vaporizer. A.R.H.

N79-26978*# Varian Associates, Lexington, Mass. Vacuum Div.
SLICING OF SILICON INTO SHEET MATERIAL SILICON SHEET GROWTH DEVELOPMENT FOR THE LARGE AREA SILICON SHEET TASK OF THE LOW COST SILICON SOLAR ARRAY PROJECT Quarterly Report, 28 Oct. - 29 Dec. 1978
J. R. Fleming 20 Jan. 1979 19 p Prepared for DOE and JPL
(Contracts NAS7-100; JPL-954374)
(NASA-CR-158743; DOE/JPL-954374-78/8; S-100-Q11) Avail: NTIS HC A02/MF A01 CSCL 20B

Tests on mineral oil slurries show that the potential for workability and low cost is present. However, slurries tested to date which had sufficient lubricity exhibited wafer breakage problems near the end of the run for as-yet unknown reasons. The first test of the large prototype saw under cutting force control was largely successful in that the controller worked perfectly. Unfortunately a technique error (excessive stroke shortening) caused blade breakage and low yield. The latest run of the large saw pointed up the fact that an indication of end-of-stoke vertical motion, or bounce, is necessary. A circuit to provide such indication was fabricated and installed. Preliminary tests show it to be excessively noise sensitive; therefore, work on grounding and shielding to reduce this sensitivity is in progress. A.R.H.

N79-26979*# Varian Associates, Lexington, Mass. Vacuum Div.
SLICING OF SILICON INTO SHEET MATERIAL: SILICON SHEET GROWTH DEVELOPMENT FOR THE LARGE AREA SILICON SHEET TASK OF THE LOW COST SILICON SOLAR ARRAY PROJECT Quarterly Report, 30 Dec. 1978 - 30 Mar. 1979

J. R. Fleming 30 Mar. 1979 24 p Prepared for DOE and JPL
(Contracts NAS7-100; JPL-954374)
(NASA-CR-158732; DOE/JPL-954374-78/1; S-100-Q12; QR-12) Avail: NTIS HC A02/MF A01 CSCL 20B

Testing of low cost low suspension power slurry vehicles is presented. Cutting oils are unlikely to work, but a mineral oil with additives should be workable. Two different abrasives were tested. A cheaper silicon carbide from Norton gave excellent results except for excessive kerf loss: the particles were too big. An abrasive treated for lubricity showed no lubricity improvement in mineral oil vehicle. The bounce fixture was tested for the first time under constant cut rate conditions (rather than constant force). Although the cut was not completed before the blades broke, the blade lifetime of thin (100 micrometer) blades was 120 times the lifetime without the fixture. The large prototype saw completed a successful run, producing 90% cutting yield (849 wafers) at 20 wafers/cm. Although inexperience with large numbers of wafers caused cleaning breakage to reduce this yield to 74%, the yield was high enough that the concept of the large saw is proven workable. M.M.M.

N79-26980*# Materials Research, Inc., Centerville, Utah.
QUANTITATIVE ANALYSIS OF DEFECTS IN SILICON: SILICON SHEET GROWTH DEVELOPMENT FOR THE LARGE AREA SILICON SHEET TASK OF THE LOW-COST SOLAR ARRAY PROJECT Quarterly Progress Report, 1 Jan. - 31 Mar. 1979
R. Natesh, J. M. Smith, and H. A. Qidwai 31 Mar. 1979 94 p refs Prepared for DOE and JPL
(Contract JPL-954977)
(NASA-CR-158724; DOE/JPL-954977-79/4; MRI-269; QPR-4) Avail: NTIS HC A05/MF A01 CSCL 20B

The various steps involved in the chemical polishing and etching of silicon samples are described. Data on twins, dislocation pits, and grain boundries from silicon samples are also discussed. Changes made to upgrade the Quantimet 720 image analysis system are reviewed. A.R.H.

N79-26981*# Crystal Systems, Inc., Salem, Mass.
SILICON INGOT CASTING, HEAT EXCHANGER METHOD MULTI-WIRE SLICING, FIXED ABRASIVE SLICING TECHNIQUE. PHASE 3: SILICON SHEET GROWTH DEVELOPMENT FOR THE LARGE AREA SHEET TASK OF THE LOW-COST SOLAR ARRAY PROJECT Quarterly Progress Report, 1 Jan. - 31 Mar. 1979
Frederick Schmid and Chandra P. Khattak Apr. 1979 40 p refs Sponsored by NASA Prepared for DOE and JPL
(Contract JPL-954373)
(NASA-CR-158734; DOE/JPL-954373-79/10; QPR-2) Avail: NTIS HC A03/MF A01 CSCL 20B

Several 20 cm diameter silicon ingots, up to 6.3 kg. were cast with good crystallinity. The graphite heat zone can be purified by heating it to high temperatures in vacuum. This is important in reducing costs and purification of large parts. Electroplated wires with 45 um synthetic diamonds and 30 um natural diamonds showed good cutting efficiency and lifetime. During slicing of a 10 cm x 10 cm workpiece, jerky motion occurred in the feed and rocking mechanisms. This problem is corrected and modifications were made to reduce the weight of the bladeheat by 50%. M.M.M.

N79-26982# Brown Univ., Providence, R. I. Dept. of Chemistry.
INTERBAND TRANSITIONS OF SEMICONDUCTING OXIDES DETERMINED FROM PHOTOELECTROLYSIS SPECTRA
Aaron Wold, F. P. Koffyberg, and K. Dwight Mar. 1979 18 p
(Contract N00014-77-C-0387; NR Proj. 359-653)
(AD-A066188; TR-5) Avail: NTIS HC A02/MF A01 CSCL 20/12

Measurements of the quantum efficiency of the photoelectrolysis of water, using semiconducting oxide anodes of high conductivity approximately equal to 1 omega cm, are used to determine the energies of the interband transitions of the oxides. GRA

N79-26983# Northwestern Univ., Evanston, Ill. Dept. of Physics and Astronomy.
ELECTRONICALLY INDUCED PHASE TRANSFORMATIONS Interim Annual Progress Report
Arthur J. Freeman Oct. 1978 17 p refs
(Grant AF-AFOSR-2948-76; AF Proj. 9767)
(AD-A067066; AFOSR-79-0279TR) Avail: NTIS HC A02/MF A01 CSCL 20/12

The electronic interactions responsible for the observed electronically induced phase transformations in several important classes of materials are being investigated theoretically in close collaboration with experimental programs at other institutions. These include destruction of superconductivity and onset of a normal magnetic state at low temperatures in ternary rare-earth superconducting compounds, charge density waves in layered transition metal dichalcogenides, origin of phonon anomalies in Pd and Pt metals, local density formalism for electronic bands, and metal-insulator phase transition in NbO2. Author (GRA)

N79-26984# Princeton Univ., N. J. Dept. of Electrical Engineering.
STUDY OF ELECTRONIC TRANSPORT AND BREAKDOWN IN THIN INSULATING FILMS Semiannual Report
Walter C. Johnson 1 Jun. 1978 80 p refs
(Contract DAAG53-76-C-0059; DARPA Order 3466)
(AD-A066918; NVL-0059-008; SATR-5) Avail: NTIS HC A05/MF A01 CSCL 20/12

Recent progress is reported in an ongoing program of studies of high-field effects in thin insulating films on semiconducting substrates. The investigations reported here include further studies of the high-field generation of interface states and electron traps in the Si-SiO2 system, a preliminary investigation of silicon dioxide grown at high pressure, and studies of CVD silicon nitride and aluminum oxide under high-field conditions. Author (GRA)

N79-26985# Lincoln Lab., Mass. Inst. of Tech., Lexington.
GaInAs AND GaInAsP MBE CRYSTAL GROWTH Annual Report, 1 May 1977 - 30 Apr. 1978
Arthur R. Calawa 30 Apr. 1978 53 p refs
(Contract F19628-78-C-0002)
(AD-A067164; ESD-TR-78-397) Avail: NTIS HC A04/MF A01 CSCL 20/12

The use of epitaxial layers and of heteroepitaxial layers of compound semiconductors in recent years has had a significant impact on the development of new and useful semiconductor devices. Interest in the quaternary alloy Ga1-xInxAs1-yPy is primarily based on the applications of this material to optical devices such as light emitting diodes (LED), photo-emissive cathodes and heterojunction lasers. The principal advantages of this material are that lattice-matched layers can be epitaxially grown on InP over a wide composition range, which permits the light emission of lasers and LEDs to be extended to longer wavelengths where optical fiber transmission is optimal. (Current state-of-the-art optical fibers have their best characteristics--minimum loss and minimum dispersion). It is also of importance in electrooptical device applications that GaInAsP is lattice-matched to a binary compound substrate (InP), which is transparent at the operating wavelength of the devices. The potential importance of these materials in microwave devices such as the metal-epitaxial semiconductor field-effect transistor (MESFET) and transferred electron devices is demonstrated in a comparison of the electron velocity-field characteristics of these alloys and of GaAs. GRA

N79-26986# Hawaii Univ., Honolulu. Dept. of Physics and Astronomy.
A STUDY OF THE ACOUSTO-OPTIC EFFECT IN NEMATICS AS A MEANS OF ACOUSTIC FIELD IMAGING
Charles F. Hayes 8 Mar. 1979 31 p refs
(Contract N00014-78-C-0417)
(AD-A067173; TR-002) Avail: NTIS HC A03/MF A01 CSCL 20/2

This contract studied the acousto-optic effect which occurs in nematic liquid crystals when excited by acoustic waves including extension and testing of the streaming model developed by C. F. Hayes. The results indicate that the model is valid. Equations have been solved giving both the magnitudes and patterns of

the induced flows. These results have been tested experimentally and agree quite well with the theory. GRA

N79-26987# Harry Diamond Labs., Adelphi, Md.
NEUTRON DAMAGE CORRELATION EXPERIMENTS IN SEMICONDUCTOR DEVICES
Paul A. Trimmer and Emmert D. McGarry Feb. 1979 28 p refs
(DA Proj. 1L1-62120-AH-25)
(AD-A066886; HDL-TR-1879) Avail: NTIS HC A03/MF A01 CSCL 09/1

Studies of radiation damage equivalence have been conducted in four different neutron environments by using silicon transistors with gain-bandwidth products covering the range from 1 MHz to 2 GHz and power ratings covering the range from 200 mW to 115 W. The neutron environments were obtained from two TRIGA reactors, a fast-burst reactor, a 14 MeV generator, and a Californium 252 fission source. Experimentally, damage factors were obtained by comparisons of changes in the reciprocal of the common-emitter dc gain as a function of measured fluences. The damage factor was the slope of the resulting curve. Corrections were made for the fraction of total damage associated with gamma radiation effects. The ratios of the slopes of the data from the different irradiation facilities give an indication of spectral differences among the facilities. These ratios do not appear to be strong functions of collector current or of the transistor type. The experimental data were compared with theoretical calculations of displacement damage as defined by the damage curves of Messenger and of Holmes. The ratio of 14 MeV generator to fast-burst reactor damage is less than predicted theoretically; the ratio of fast-burst reactor to TRIGA reactor is higher than calculated. Uncertainties in the parameter and dosimetry measurements could account for some of the observed differences, but the uncertainty in the spectra content of the reactors is probably the major contributor. Author (GRA)

N79-26988# TRW Defense and Space Systems Group, Redondo Beach, Calif.
LASER ASSISTED SEMICONDUCTOR DEVICE PROCESSING Semiannual Technical Report, 1 Jun. 1978 - 30 Jan. 1979
Robert S. White 30 Jan. 1979 117 p refs
(Contract MDA903-78-C-0284; ARPA Order 3578)
(AD-A067183; TRW-33292-000) Avail: NTIS HC A06/MF A01 CSCL 20/12

The objective of this task is to evaluate and characterize laser induced processing of semiconductor materials and devices, with emphasis on the III-V compound series. Laser processing comprises three principal phenomena: photon absorption, conversion of absorbed photon energy to heat, and material response to the thermal stimulus. We are examining each of these phenomena in detail both theoretically and experimentally. We have developed a model that includes, in addition to normal band-to-band absorption, absorption due to laser generated free carriers. The model assumes that the two effects are additive, and that the band-to-band absorption coefficient is constant and equal to its small signalvalue. We have found that, under these conditions, band-to-band absorption predominates when the laser wavelength is shorter than the bandgap wavelength. We regard the use of the small signal absorption coefficient, however, to be suspect, especially when the laser wavelength is close to the bandgap wavelength. GRA

N79-26989# Virginia Univ., Charlottesville. Dept. of Chemistry.
TETRACARBON METALLOCARBORANCES. 6: STEREOCHEMICAL RELATIONSHIPS BETWEEN Co2C4B6 CAGE ISOMERS FORMED BY OXIDATIVE FUSION. CRYSTAL STRUCTURE OF (n5-C5H5)2Co2(CH3)4C4B6H6 ISOMER 5
J. Robert Pipal and Russell N. Grimes Apr. 1979 29 p refs
(Contract N00014-75-C-0305)
(AD-A067836; TR-27-6) Avail: NTIS HC A03/MF A01 CSCL 07/3

Structural studies of carboranes and metallocarboranes having four carbon atoms in the same polyhedron are proving to be an effective probe of the relationship between electron population and cage geometry, and have revealed a number of unprecedented molecular shapes. Since the formal replacement of a BH by a CH (or C-alkyl) group in a closed polyhedral (closo) system increases the number of valence electrons in the cage skeleton, one can predict from electron-counting arguments that tetracarbon carboranes will exhibit cage structures that are more open than their dicarbon counterparts; simply put, this is a consequence of the fact that the additional electrons in most cases must occupy antibonding orbitals, thereby producing some sort of cage-opening or distortion. Author (GRA)

N79-26990# Yeshiva Univ., New York, N. Y. Belfer Graduate School of Science.
GROWTH AND HOMOGENEITY CHARACTERIZATION OF MERCURY CADMIUM TELLURIDE CRYSTALS Final Report, 1 Apr. 1974 - 31 Aug. 1978
Fred Pollak Jan. 1979 10 p refs
(Grant AF-AFOSR-2714-74)
(AD-A067670; AFOSR-79-0452TR) Avail: NTIS HC A02/MF A01 CSCL 20/2

We have grown epitaxial layers of mercury telluride by the new method of current controlled liquid phase epitaxy (CCLPE). We have designed and constructed the apparatus necessary to grow highly homogeneous crystalline layers of this material by this new technique. The design has been tested repeatedly and a number of crystalline layers have been successfully grown These layers have been studied micrographically and with the use of X-ray diffraction and electrolyte electroreflectance techniques. Author (GRA)

N79-26991# Stanford Univ., Calif. Center for Materials Research.
GROWTH OF HIGH PHASE-MATCH TEMPERATURE LiNbO3 SINGLE CRYSTALS Annual Report, period ending 15 Mar. 1978
Wayne L. Kway and R. S. Feigelson Sep. 1978 14 p refs
(Contract W-7405-eng-48)
(UCRL-13939) Avail: NTIS HC A02/MF A01

LiNbO3 crystal with T/sub pm/greater than or equal to 180 C together with excellent phase matching characteristics and a high degree of optical homogeneity can be grown by the Czochralski technique with the following set of growth parameters: a melt composition of .54 Li2O/.46 Nb2O5 doped with 1.0 mole % MgO; a growth rate of 2 mm/hr or less; positive axial and radial temperature gradients; and a crystal rotation rate of 50 rpm or higher to provide for a planar solid-liquid growth interface. DOE

N79-26992# Ames Lab., Iowa.
LATTICE PARAMETERS OF IRON-ALUMINUM SILICON ALLOYS WITH THE DO3 STRUCTURE M.S. Thesis - Iowa State Univ.
S. J. Cowdery Jan. 1979 37 p refs
(Contract W-7405-eng-82)
(IS-T-831) Avail: NTIS HC A03/MF A01

The room temperature lattice parameters of Fe75Si/sub x/Al/sub 25-x/ alloys for x = 0 to 25 and Fe73Si/sub x/Al/sub 27-x/ alloys for x = 13.5 to 24.3 were measured, as well as alloys of the composition Fe68Si10Al22 and Fe73 7Si16 6Al9 7, by X-ray techniques. Debye Scherrer powder photographs and a singly-iterative, weighted least-squares computer program were employed. The values obtained were found to vary non-linearly from 5.6533A for Fe3Si to 5.7935A for Fe3Al for the Fe75Si/sub x/Al/sub 25-x/ alloys, and from 5.6569A for 10 wt % Fe73Al27-90 wt % Fe73Si27 to 5.7148A for 50 wt % Fe73A127-50 wt % Fe73Si27 for the Fe73S8/sub x/Al/sub 27-x/ alloys. A polynomial fit was obtained for both curves. The lattice parameters of Fe68Si10Al22 was found to be 5.7308A and that of Fe73 7Si16 6Al9 7, the Sendust alloy, 5.6994A. All values are corrected for refraction. Preliminary elastic constant measurements were also performed on a Fe3Al single crystal at 77.4 K. DOE

N79-26993# Laboratoire Central de Recherches Thomson-CSF, Orsay (France).
LOW FREQUENCY PHENOMENA IN SMECTIC A LIQUID CRYSTALS Final Report [ETUDE DES PHENOMENES BASSE FREQUENCE DANS LES SMECTIQUES A]
Serge Leberre and Michael Hareng Oct. 1977 56 p refs In FRENCH; ENGLISH summary

(Contract DGRST-76-7-0117)
Avail: NTIS HC A04/MF A01

Several results obtained when a smectic A liquid crystal is subjected to an electric field are reported. The planar to homeotropic transition was characterized (by a capacitive analysis). A threshold voltage was found which depends upon the sample thickness and the temperature. The quasi-homeotropic structure obtained under applied voltage gives rise, by a relaxation process, to a scattering texture which was studied. The structure and the relaxation time depend on (T sub AN -T). The mechanisms involved in the different transitions show a frequency dependence. First results demonstrate two different kinds of mechanism. These are a conduction regime. A critical frequency very close to the charge relaxation frequency was observed. Author (ESA)

N79-26994# National Bureau of Standards, Washington, D. C.
SEMICONDUCTOR MEASUREMENT TECHNOLOGY: DISTRIB 1, AN IMPURITY REDISTRIBUTION COMPUTER PROGRAM Final Report, Jul. 1973 - Dec. 1975
David Gilsinn and Richard Kraft Feb. 1979 132 p refs
(ARPA Order 2397)
(PB-293293/7; NBS-SP-400-57; LC-79-600002) Avail: NTIS HC A07/MF A01 CSCL 20L

A computer program which calculates the redistribution of impurities in silicon during a single oxidation step is documented. The documentation provides: (1) a physical and mathematical description of the redistribution process; (2) a detailed description of the discretization of the appropriate partial differential equations; and (3) a complete description of the Fortran program for computing the solution. GRA

77 THERMODYNAMICS AND STATISTICAL PHYSICS

Includes quantum mechanics; and Bose and Fermi statistics.

For related information see also *25 Inorganic and Physical Chemistry* and *34 Fluid Mechanics and Heat Transfer.*

N79-26995 Illinois Univ. at Urbana-Champaign.
SOME NON-PERTURBATIVE RESULTS IN RELATIVISTIC FIELD THEORY Ph.D. Thesis
Steven Frederick Magruder 1978 111 p
Avail: Univ. Microfilms Order No. 7913539

The descriptions of two new non-perturbative results in relativistic field theory are presented. A transformation which can be used to relate the strong coupling limit of the (phi 4)3 quantum field theory to the weak coupling limit of the same theory is described. This transformation can be used to show the existence of a phase transition in the above theory as the coupling constant is increased with the mass parameter held fixed. The derivation of the transformation involves Zimmerman normal operator techniques. A variational calculation of the classical interactions of 't Hooft monopoles is also described. These interactions are interesting because 't Hooft monopoles appear as instantons in the Georgi-Glashow theory of weak and electromagnetic interactions. The interactions of the instantons are directly related to the question of confinement of the fermions in this theory. Dissert. Abstr.

N79-26996 Illinois Univ. at Urbana-Champaign.
A CHEMICAL THEORY FOR THE THERMODYNAMICS OF HIGHLY SOLVATED LIQUID METAL MIXTURES Ph.D. Thesis
Robert Bruce Irwin 1978 150 p
Avail: Univ. Microfilms Order No. 7913496

Experimental electromotive force studies of the Mg-Sb, Mg-Bi, and Mg-Sb-Sn liquid metal systems were made using EMF concentration cells which utilize porous inert disks to promote equilibrium operation of the cells. The experiments were performed in an effort to locate possible solvents for the reduction of magnesium oxide. The chemical theory model was to describe the interactions among magnesium and the solvents in the liquid phase as well as to predict activity coefficients in a ternary system using binary data. The results, which show good agreement when compared to ternary data were used to optimize a solvent for magnesium oxide reduction. The selection of highly solvated liquid metal systems by observing the characteristics of binary phase diagrams is also discussed. Dissert. Abstr.

N79-26997 Colorado School of Mines, Golden.
ENTHALPY MEASUREMENTS FOR COAL-DERIVED LIQUIDS Ph.D. Thesis
Gholam-Hossein Omid 1978 183 p
Avail: Univ. Microfilms Order No. 7912225

Experimental enthalpy measurements were made on a liquid derived from a Western Kentucky coal by the char-oil-energy-development process, over the range of 100 to 1500 psia and 122 to 705 F, and also on a distillate derived from this liquid over the range of 119 to 756 F and 60 to 500 psia. The following analyses were made to characterize the coal-liquids: coal-liquids characterization (PERC) method, total carbon-hydrogen-nitrogen analysis, total sulfur analysis, refractive index, PONA analysis, heteroatomic content, and aromatic content. Enthalpy correlations already developed were used to predict the enthalpies of the coal-liquid samples. The results compared better with experimental enthalpies at lower temperatures (approximately 300 F) than at higher temperatures (approximately 700 F). A factor was incorporated in one of the correlations to correct the presence of the heteroatomic compounds in the samples. With this modification, the predicted enthalpies were within the experimental accuracy. Dissert. Abstr.

N79-26998# California Univ., Berkeley. Lawrence Berkeley Lab.
THERMODYNAMICS AND MECHANISMS OF SINTERING
Joseph A. Pask Oct. 1978 30 p refs Presented at Intern. Symp. on Factors in Densification and Sintering of Oxide and Non-oxide Ceram., Hakone, Japan, 3 Oct. 1978
(Contract W-7405-eng-48)
(LBL-8419; Conf-7810129-1) Avail: NTIS HC A03/MF A01

The factors which play a role in the process of densification of model compact systems consisting of crystalline spheres of uniform size in regular and irregular packing that form grain boundaries at every contact point are presented. The presence of isotropic surface and grain boundary energies is assumed. Although such systems are unrealistic in comparison with normal powder compacts, their potential sintering behavior can be analyzed and provided with a limiting set of behavior conditions which can be looked upon as one boundary condition. A basis for understanding the more complex real powder systems is provided. DOE

N79-26999# Ames Lab., Iowa.
THERMODYNAMIC PROPERTIES OF URANIUM-MERCURY SYSTEM M.S. Thesis - Iowa State Univ.
Tsang-Sheau Lee Jan. 1979 58 p refs
(Contract W-7405-eng-82)
(IS-T-824) Avail: NTIS HC A04/MF A01

The EMF values in the fuse salt cells of the type U (alpha)/KCl-LiCl-BaCl2 eutectic, UCl3/U-Hg alloy, for the different two-phase alloys in the uranium-mercury system were measured and the thermodynamic properties of this system were calculated. These calculated values are in good agreement with values based on mercury vapor pressure measurements made by previous investigators. The inconsistency of the thermodynamic properties with a phase diagram are also confirmed. A tentative phase diagram based on the thermodynamic properties measured in this work was constructed. DOE

N79-27000# California Univ., Livermore. Lawrence Livermore Lab.
THERMODYNAMIC CHARACTERIZATION OF LIQUID METALS AT HIGH TEMPERATURE BY ISOBARIC EXPANSION MEASUREMENTS
G. R. Gathers, J. W. Shaner, and W. M. Hodgson 21 Jun. 1978 26 p refs Presented at the 6th Thermophys. Properties Conf., Dubrovnik, Yugoslavia, 26 Jun. 1978
(Contract W-7405-eng-48)
(UCRL-80114; Conf-789115-1) Avail: NTIS HC A03/MF A01

Results of isobaric expansion measurements for platinum

are presented, including simultaneous values for enthalpy, specific volume, temperature and electrical resistivity in tabular form as well as numerical fits up to 7500 K. The specific heat for the liquid is C/sub p/ = 5.85 + or -0.30 R and is essentially constant up to 7500 K. The bulk thermal expansion coefficient increases from approximately 7.5 x 10 to the -5 power K/1 at melt to approximately 1.03 x 10 to the -4 power k/1 at 7500 K. The heat of fusion observed is delta h = 0.14 + or -0.03 MJ/kg and the melting point slope with pressure is estimated to be dT/sub m//dp = 31 + -10 K/GPa. The estimated critical parameters are T/sub c/ = 9285 K, P/sub c/ = 0.9492 GPa, v/sub c/ = 1.120 x 10 to the -4 power cu m/kg and z/sub c/ = 0.5085. Preliminary results of a new sound velocity technique are discussed for lead. This technique will allow determination of specific heat c/sub v/, isothermal compressibility K/sub T/ and the constant temperature volume derivatives of entropy and internal energy, as well as the Gruneisen parameter gamma/sub G/. DOE

N79-27001# Columbia Univ., New York. Liquid Metals Research Lab.

HIGH TEMPERATURE PROPERTIES OF NUCLEAR REACTOR COOLANTS AND THERMODYNAMIC POWER CYCLE WORKING FLUIDS Technical Progress Report, 1 Dec. 1977 - 30 Nov. 1978

Charles F. Bonilla and Gerald P. Holder Sep. 1978 39 p refs
(Contract EY-76-S-02-3027)
(COO-3027-37) Avail: NTIS HC A03/MF A01

The surface tension of sodium to high temperatures is being studied using an all-molybdenum maximum-bubble-pressure apparatus suitable to some 1900 K. This property bears on boiling, condensing and two-phase flow phenomena, also related to LMFBR analysis. This same apparatus will be useful with lithium, of interest in fusion reactor cooling. Reduction of prior maximum bubble pressure results on potassium by the Schroedinger method was repeated by the more precise but time-consuming Sugden procedure, which increased the resulting surface tension values by an average of 0.27 percent. Thus, the Sugden method will be employed to reduce the data for sodium and lithium. DOE

80 SOCIAL SCIENCES (GENERAL)

Includes educational matters.

No abstracts in this category.

81 ADMINISTRATION AND MANAGEMENT

Includes management planning and research.

N79-27002*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.

SCATS: SRB COST ACCOUNTING AND TRACKING SYSTEM HANDBOOK

Ross B. Zorv, Rodney D. Stewart, Gary Coley, and Marie Higginbotham Jun. 1978 42 p
(NASA-TM-78302) Avail: NTIS HC A02/MF A01 CSCL 05A

The Solid Rocket Booster Cost Accounting and Tracking System (SCATS) which is an automatic data processing system designed to keep a running account of the number, description, and estimated cost of Level 2, 3, and 4 changes is described. Although designed specifically for the Space Shuttle Solid Rocket Booster Program, the ADP system can be used for any other program that has a similar structure for recording, reporting, and summing numbers and costs of changes. The program stores the alpha-numeric designators for changes, government estimated costs, proposed costs, and negotiated value in a MIRADS (Marshall Information Retrieval and Display System) format which permits rapid access, manipulation, and reporting of current change status. Output reports listing all changes, totals of each level, and totals of all levels, can be derived for any calendar interval period. G.Y.

N79-27003# Pennsylvania Univ., Philadelphia. Wharton School of Finance.

MODEL MANAGEMENT SYSTEMS: A FRAMEWORK FOR DEVELOPMENT Technical Report, Jan. - Dec. 1979

Joyce J. Elam 12 Feb. 1979 28 p refs
(Contract N00014-75-C-0440)
(AD-A067246; Rept-79-02-04) Avail: NTIS HC A03/MF A01 CSCL 05/1

This paper presents an architecture for a generalized model management system that facilitates the integration of management science models into a decision support system. The objective of the system is to support the decision-maker both in specifying a problem and in effecting a solution. This is accomplished by providing him/her with a means for interacting with a complex structured database to specify the structure of some problem; and to solve the model defined for the problem using appropriate information -- either from the database or some other source -- and efficient solution procedures. Author (GRA)

N79-27004# Massachusetts Inst. of Tech., Cambridge. Operations Research Center.

A COMPARISON OF HEURISTIC METHODS USED IN HIERARCHICAL PRODUCTION PLANNING

Elizabeth A. Haas, Arnoldo C. Hax, and Roy E. Welsch Mar. 1979 34 p refs
(Contract N00014-75-C-0556)
(AD-A066932; TR-160) Avail: NTIS HC A03/MF A01 CSCL 12/2

Hierarchical planning systems support medium range planning decisions in a batch processing production environment. In this approach, higher level (tactical) decisions impose constraints on lower level (operational) actions. Several heuristic approaches to hierarchical production planning have been proposed in the management science literature. This paper compares, conceptually and empirically, four of these approaches. The paper begins by discussing the direct optimization approach, and its associated drawbacks. The second section briefly describes several approaches to the design of a hierarchical production planning system and the distinguishing characteristics of the resulting algorithms. The third section compares four different methodologies for disaggregating tactical plans in a hierarchical setting. The paper concludes with recommendations for specific approaches to disaggregation in differing production environments. GRA

N79-27005# Tactical Air Command, Langley AFB, Va. Concepts Div.

A USER'S GUIDE FOR TAC PERT

Howard J. Talley, Jr. 12 Apr. 1979 50 p refs
(AD-A068012; TAC/XPB-TN-79-5) Avail: NTIS HC A03/MF A01 CSCL 09/2

This note documents the use of the Program Evaluation and Review Technique (PERT) to assist in the close management of large programs. This note includes a general description of PERT methodology, specific conventions used in adopting this methodology to TAC'S hardware and software, a description of the output products available and a discussion of utility and requirements of this tool in program management. The results are referred to as TAC PERT. Author (GRA)

N79-27006# Logistics Management Inst., Washington, D. C.

FINCAP ANALYSIS: A METHOD FOR FINANCIAL CAPABILITY ANALYSIS OF AIR FORCE CONTRACTORS

Josephus O. Parr, Robert O. Edmister, and M. Brian McDonald Mar. 1979 153 p refs
(Contract MDA903-77-C-0370)
(AD-A067998; LMI-AF714) Avail: NTIS HC A08/MF A01 CSCL 05/1

FINCAP Analysis is a method for evaluating the financial capability of major Air Force Contractors. It is designed for use by contracting personnel who may have only a limited financial analysis background. FINCAP Analysis results in a comprehensive evaluation of a contractor's present and expected future financial condition, including its capability to perform a new

contract. For analysis ratios and projections, FINCAP Analysis uses the FINANDAS computer system previously developed by LMI for DoD use. The manual explains the analysis method in step-by-step instructions. Also included are lists of data sources, data collection forms, detailed report and briefing formats, and a financial evaluation checklist. Author (GRA)

N79-27007# Ohio State Univ., Columbus. Computer and Information Science Research Center.
INFORMATION FLOW AND ANALYSIS: THEORY SIMULATION, AND EXAMPLES. PART 1: BASIC THEORETICAL AND CONCEPTUAL DEVELOPMENT. PART 2: SIMULATION, EXAMPLES AND RESULTS
M. C. Yovits and Lawrence L. Rose Sep. 1978 84 p refs
(Grants NSF DSI-76-21949; NSF GN-41628)
(PB-293458/6; OSU-CISRC-TR-78-5-Pt-1; OSU-CISRC-TR-78-5-Pt-2) Avail: NTIS HC A05/MF A01 CSCL 12B

Variables and parameters in the information flow process are examined. Relationships among these variables are established and the resulting theory is applied to practical situations. Models, both simulation and experimental, are developed to utilize and validate the theory. Specifically, quantitative definitions and relationships are developed for quantity of information, value of information, effectiveness of information, decision maker effectiveness, decision maker performance, and other terms. A flexible, sophisticated simulation model which permits the examination of the interrelationship between information and decision making for a wide variety of different situations is described. GRA

82 DOCUMENTATION AND INFORMATION SCIENCE

Includes information storage and retrieval technology; micrography; and library science.

For computer documentation see *61 Computer Programming and Software*.

N79-27008 State Univ. of New York at Buffalo.
ADVANCED INFORMATION PROCESSING USING MICRO-ARCHITECTURE PROGRAMMED DESIGN Ph.D. Thesis
Jian-Chung Yuan 1979 132 p
Avail: Univ. Microfilms Order No. 7913943

The organization and the general concepts of digital computer systems are introduced and the program operation sequence in a digital computer is described. The advantages and disadvantages of a microprogrammable computer are explored as well as the design concepts of the system organization, memory management, and the operating system of the multiprocessor computer system. Dissert. Abstr.

N79-27009# Committee on Governmental Affairs (U. S. Senate).
FEDERAL INFORMATION CENTERS ACT
Washington GPO 1978 19 p Rept. to accompany S. 3259 from the Comm. on Governmental Affairs, 95th Congr., 2d Sess., 22 Aug. 1978
(S-Rept-95-1129; GPO-32-715) Avail: US Capitol, Senate Document Room

The Committee on Governmental Affairs to which was referred the bill (S. 3259) a bill to authorize the establishment of Federal information centers, having considered the same, reports favorably thereon without amendment and recommends that the bill do pass. S.3259 is to establish legislative authority for a national system of Federal information centers. Federal information centers provide direct help to citizens with questions about Federal Government services, progams and regulations. The Federal Information Centers Act authorizes the Adminstrator of the General Services Administration (GSA) to establish a nationwide network of Federal information centers. The Administrator is further authorized to prescribe necessary regulations for managing the information centers. G.Y.

N79-27010# Pennsylvania Univ., Philadelphia. Dept. of Decision Sciences.
A DATABASE INTERFACE TO WAND FOR THE NETWORK ALERTER SERVICE Technical Report, Apr. 1978 - Mar. 1978
James Steven Ribeiro Dec. 1978 53 p refs
(Contract N00014-75-C-0462; NR Proj. 049-272)
(AD-A066993; Rept-78-11-02) Avail: NTIS HC A04/MF A01 CSCL 09/2

The Database Interface (DBI) is responsible for monitoring conditions on a data base managed by a particular type of Database Management System (DBMS). At the Wharton School there are several large databases which are managed by WAND, a CODASYL-like DBMS. This thesis outlines the design and implementation of a DBI for WAND. The DBI will be integrated into the Network Alerter Service (NAS) which is being designed and implemented as a general user service for ARPANET users. The NAS will allow the monitoring of databases at various sites on the ARPANET, for conditions of interest to the user. The WAND DBI is capable of efficiently monitoring these conditions or alerters, and responding appropriately when the previously specified condition occurs. This monitoring must be done efficiently since the performance of the DBMS may otherwise become extremely degraded. Author (GRA)

N79-27011# Pennsylvania Univ., Philadelphia. Dept. of Decision Sciences.
Q, A COMMUNICATIONS QUERY LANGUAGE FOR SEED Technical Report, Apr. 1978 - Mar. 1979
Jonathan Hayward, Rajeev Sangal, and O. Peter Buneman May 1978 25 p refs
(Contract N00014-75-C-0462)
(AD-A066994; Rept-78-05-02) Avail: NTIS HC A02/MF A01 CSCL 09/2

The advent of computer networking has made increasingly important the task of designing languages with which another program may talk to a database system. The DATACOMPUTER supports a query language which was designed to be generated by other programs. It maintains a quasi-relational database system with no direct linking between records. Q is an attempt to do the same thing for a network database: specifically SEED, which is a codasyl like system developed at the Wharton School. Author (GRA)

N79-27012# Pennsylvania Univ., Philadelphia. Dept. of Decision Sciences.
EXTENSIBLE DATA BASES Technical Report, Apr. 1978 - Mar. 1979
Jonathan W. Hayward May 1978 68 p refs
(Contract N00014-75-C-0462)
(AD-A067015; Rept-79-03-08) Avail: NTIS HC A04/MF A01 CSCL 09/2

Traditional database systems only allow queries to be made about the data within the database, rather than about the data as well as the structure of the data. A set of primitive operations is proposed which allow a flexible means of entering and exploring the data and the structure of a database. Author (GRA)

N79-27013# Pennsylvania Univ., Philadelphia. Dept. of Decision Science.
CONTROL PROGRAMS AND DATA STRUCTURES FOR A MULTIPLE ALERTER IMPLEMENTATION IN A RELATIONAL DATA BASE Technical Report, Apr. 1978 - Mar. 1979
Carlos J. Serra Dec. 1978 112 p refs
(Contract N00014-75-C-0462)
(AD-A067168; Rept-79-03-07) Avail: NTIS HC A06/MF A01 CSCL 07/2

This paper describes the control programs and data structures used to implement multiple alerters in a relational data model environment. Alerters provide data base management systems with the capabilities of dynamically monitoring for the presence of user defined states of the data, and executing some predetermined action as a consequence of their detection. One of the main considerations in the implementation of an alerter system on a relational data base is the efficiency with which a change to a virtual relation can be detected. Programs are described for the definition, maintenance and evaluation of virtual relations. This work includes details of the use of construction diagrams as a means for their representation, as well as descriptions of the techniques for avoiding unnecessary recompu-

tation and, when required, efficiently performing partial evaluation. Author (GRA)

N79-27014# Lehigh Univ., Bethlehem, Pa.
STRUCTURING OF DATA SYSTEMS: PSYCHOPHYSIOLOGICAL DATA FROM THE DYNAMIC FLIGHT SIMULATOR Final Report
Bruce D. Fritchman and John G. Nelson 9 Mar. 1979 39 p refs
(Contract N62269-77-C-0347)
(AD-A067175; NADC-79052-60) Avail: NTIS HC A03/MF A01 CSCL 14/2

This investigation considered the methods and problems of collection, storage, processing and display of psychophysiological data from dynamic flight simulation in the Naval Air Development Center human centrifuge, using analog, mini, and remote main-frame computers. An integrated data processing system is described. Problems associated with data collection and storage are evaluated, and alternate solutions discussed. Anticipated problems in the development of data processing software are examined, and the applicable basic technology identified. Approaches to the critical problem of orderly and systematic development and maintenance of software for semi-open-shop operations is examined. Author (GRA)

N79-27015# Pennsylvania Univ., Philadelphia. Dept. of Decision Sciences.
THE MULTIPLE PATH PROBLEM IN DATA BASE SCHEMATA Technical Report, Apr. 1978 - Mar. 1979
O. Peter Buneman Jan. 1979 21 p refs
(Contract N00014-75-C-0462)
(AD-A067147; Rept-79-03-06) Avail: NTIS HC A02/MF A01 CSCL 09/2

Certain database query systems, especially those that interpret natural language, do not require the user to have comprehensive knowledge of the database schema in order to form a meaningful query. Instead, the query is used to reference entities in the database schema and a path is automatically found through the schema which connects those entities. In this paper, we will classify those schemata in which all paths are equivalent, and then derive a method of marking a schema in order to determine the natural paths between two entities when different paths give rise to different results. Author (GRA)

N79-27016# Mechanical Properties Data Center, Traverse City, Mich.
THE MECHANICAL PROPERTIES DATA CENTER Final Report, 16 Sep. 1977 - 16 Feb. 1979
Robert C. Braden Mar. 1979 31 p refs
(Contract DSA900-78-C-0447)
(AD-A067974; AMMRC-TR-79-20; AR-15) Avail: NTIS HC A03/MF A01 CSCL 05/2

This report reviews and discusses the continuing operation and development of the Mechanical Properties Data Center. Activity and growth of the Center are discussed in terms of the six major areas: Input, File Maintenance, Output, Systems Development, Management and Marketing-Sales. Author (GRA)

N79-27017# Forest Products Lab., Madison, Wis.
AN INFORMATION RETRIEVAL SYSTEM FOR RESEARCH FILE DATA
Joan E. Lengel and John W. Koning, Jr. 1978 9 p refs
(AD-A068021; FSGTR-FPL-17) Avail: NTIS HC A02/MF A01 CSCL 09/2

Research file data have been successfully retrieved at the Forest Products Laboratory through a high-speed cross-referencing system involving the computer program FAMULUS as modified by the Madison Academic Computing Center at the University of Wisconsin. The method of data input, transfer to computer storage, system utilization, and effectiveness are discussed. Preliminary results indicate that the system is readily usable by either on-line or batch processing, resulting in minimum return of results of about 1/2 hour and a maximum wait of 24 hours. The vocabulary method of single keywords is used with certain modifications to improve the precision of the recalled data. Author (GRA)

N79-27018# Oak Ridge National Lab., Tenn. Information Div.
INVENTORY OF DATA BASES, GRAPHICS PACKAGES, AND MODELS IN DEPARTMENT OF ENERGY LABORATORIES
C. R. Shriner, ed. and L. J. Peck, ed. Nov. 1978 278 p refs
(Contract W-7405-eng-26)
(ORNL-EIS-144) Avail: NTIS HC A13/MF A01

A central inventory of energy-related environmental bibliographic and numeric data bases, graphics packages, integrated hardware/software systems, and models was compiled to facilitate on-line data retrieval on the DOE/RECON system. The data descriptions are organized under major data types and include descriptions of subject content, documentation, and contact persons. Also provided are computer data such as media on which the item is available size of the item computer on which the item executes, minimum hardware configuration necessary to execute the item, software languages(s) and/or data base management system utilized, and character set used. Additional data provided to define the model more accurately include a general statement of algorithms, computational methods, and theories used by the model; organizations currently using the model; the general application area of the model; sources of data utilized by the model; model validation methods, sensitivity analysis, and procedures; and general model classification. DOE

N79-27019# Stanford Linear Accelerator Center, Calif.
ATROPOS: A VERSATILE DATA ACQUISITION AND ANALYSIS SYSTEM
C. A. Logg and R. L. A. Cottrell Oct. 1978 8 p refs Presented at the fall DECUS US Symp., San Francisco, 29-30 Nov. 1978
(Contract EY-76-C-03-0515)
(SLAC-Pub-2220; Conf-781159-4) Avail: NTIS HC A02/MF A01

Versatile, portable, rugged, and compact test and control modules for use in the development and testing of detection equipment for high-energy physics experiments are frequently needed at SLAC. The basic system developed is based on an LSI-11 microcomputer with 24K RAM, 4K ROM, 2 serial interfaces (one to the console terminal, the other to the large SLAC IBM computer complex (the TRIPLEX)), a programable clock, and a CAMAC crate controller. Results of the real-time analysis, by both the microcomputer and the TRIPLEX program may be displayed in graphical or tabular form on the console terminal. The software is written in a modular fashion so that the user can supply his own data reading and analysis routines. This system has been in use for two years. DOE

N79-27020# Computer Horizons, Inc., Cherry Hill, N. J.
INTERNATIONAL SCIENCE INDICATORS: DEVELOPMENT OF INDICATORS OF INTERNATIONAL SCIENTIFIC ACTIVITY USING THE SCIENCE CITATION INDEX Final Report
Mark Carpenter Mar. 1979 370 p
(Grant NSF SRS-77-22770)
(PB-293033/7) Avail: NTIS HC A16/MF A01 CSCL 05B

The manual covers the methodologies of scientific literature indicators prepared for the Science Indicators Unit of NSF for the period 1970-1976. Detailed descriptions are provided of the data base, classification procedures, and the indicators themselves. The progressive development of analytic methods with emphasis on those used for the 1975 data set is explained. Strengths and weaknesses of the various methods and indicators are delineated. GRA

N79-27021# National Bureau of Standards, Washington, D. C.
DATA BASE AVAILABLE AT THE NATIONAL BUREAU OF STANDARDS LIBRARY
Diane Cunningham Mar. 1979 53 p refs
(PB-293170/7; NBSIR-78-1577) Avail: NTIS HC A04/MF A01 CSCL 05B

Data bases available on-line at the National Bureau of Standards (NBS) library are listed. The list is alphabetical by either the acronym or the full title of the data base, whichever is most commonly used. Such information as name of data base, dates of coverage, brief description of the data base, the principle sources employed in forming the data base information, the producer(s) of the data base, the corresponding hard copy, and

the vendor(s) who distribute the various data bases is included. The General Subject Index, which follows the list of data bases, is arranged alphabetically by broad subject categories with references to the corresponding data bases. The Cross Reference Index lists variant forms of the names of the data bases in the left hand column with cross references to the name of the data bases used in this report on the right. GRA

83 ECONOMICS AND COST ANALYSIS

Includes cost effectiveness studies.

No abstracts in this category.

84 LAW AND POLITICAL SCIENCE

Includes space law; international law; international cooperation; and patent policy.

No abstracts in this category.

85 URBAN TECHNOLOGY AND TRANSPORTATION

Includes applications of space technology to urban problems; technology transfer; technology assessment; and surface and mass transportation.

For related information see *03 Air Transportation and Safety*, *16 Space Transportation*, and *44 Energy Production and Conversion*.

N79-27022 Colorado State Univ., Fort Collins.
DEVELOPMENT OF A DRAINAGE WITH FLOOD CONTROL MANAGEMENT SYSTEM FOR URBANIZING COMMUNITIES Ph.D. Thesis
Eugene Joseph Riordan 1978 231 p
Avail: Univ. Microfilms Order No. 7913832

Uncertainties are clarified and a readily implementable drainage and flood control management system for the mitigation of development-induced drainage impacts is developed. The objectives are realized through a detailed examination of and recommendation on the three major elements of a drainage management system: the technical element which establishes the method of flood hydrology calculation, the financial element which establishes the methods for drainage and flood control cost calculation and cost allocation, and the regulatory element which establishes the enforcement mechanism of the drainage management program. Dissert. Abstr.

N79-27023*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
LOW-POWER BASELINE TEST RESULTS FOR THE GPU 3 STIRLING ENGINE Final Report
Lanny G. Thieme Apr. 1979 68 p refs Document includes microfiche supplement. Supplement is available from NTIS.
(Contract EC-77-A-31-1040)
(NASA-TM-79103; E-9927; DOE/NASA/1040-79/6) Avail: NTIS HC E04/MF A01 CSCL 10B

A 7.5 kW (10 hp) Stirling engine was converted to a research configuration in order to obtain data for validating Stirling-cycle computer simulations. Test results for a range of heater-tube gas temperatures, mean compression-space pressures, and engine speeds with both helium and hydrogen as the working fluid are summarized. An instrumentation system to determine indicated work is described and preliminary results are presented. G.Y.

N79-27024# Polytechnic Inst. of New York, Brooklyn. Transportation Training and Research Center.
FUTURE DIRECTIONS FOR PUBLIC TRANSPORTATION: A BASIS FOR DECISION Final Report, Sep. 1977 - Dec. 1978
Anthony J. Weiner, Louis J. Pignataro, Arnold J. Bloch, William H. Crowell, William R. McShane, and Romualdus Sviedrys Dec. 1978 87 p refs
(Contract DOT-UT-NY-11-0017)
(PB-292781/2; UMTA-NY-11-0017-79-1) Avail: NTIS HC A05/MF A01 CSCL 13B

A long range planning study that was prepared to assist the Urban Mass Transportation Administration (UMTA) in its planning to meet the mobility needs of the American population in the coming decades is presented. The authors identified a number of important societal forces and considered reasonable scenarios based upon those forces, with particular attention to the implications for the mobility of people in the public sector. Conclusions and recommendations for future UMTA policy decisions as well as a list of references are provided. GRA

N79-27025# Aerospace Corp., El Segundo, Calif.
ASSESSMENT OF AN EMPIRICAL TECHNIQUE FOR ESTIMATING VEHICLE AERODYNAMIC DRAG FROM VEHICLE SHAPE PARAMETERS Final Report
W. M. Smalley and W. B. Lee Jul. 1978 109 p refs
(Contract EPA-68-03-2482)
(PB-292160/9; ATR-78(7623-03)-1) Avail: NTIS HC A06/MF A01 CSCL 13F

The results of a determination of aerodynamic drag coefficient, CD, based on empirical prediction technique developed by The Aerospace Corporation is presented. An aircraft type drag build-up approach wherein the total drag is calculated as the sum of CD contributions from components of the vehicle is utilized. Component contributions are determined from various body/chassis shape parameters. The acquisition and application of vehicle measurements data as required to evaluate aerodynamic road load by this prediction method for comparison with measured values are reported. Comparison of passenger car test results with wind tunnel test data on twelve of the vehicles showed good agreement on an average basis; the maximum disparity in an individual result was 18 percent. GRA

N79-27026# Environmental Research Inst. of Michigan, Ann Arbor.
SEMTAP: A NEW TECHNOLOGY TRANSFER NETWORK TO LINK BUSINESS AND INDUSTRY WITH FEDERAL RESEARCH AND DEVELOPMENT Final Report, Oct. 1976 - Nov. 1978
Mar. 1979 50 p refs
(Grant EDA-99-06-09572)
(PB-292882/8; EDA-79-027) Avail: NTIS HC A04/MF A01 CSCL 05A

The technical assistance study under the Southeastern Michigan Technical Assistance Program (SEMTAP) was established consisting of the Environmental Research Institute of Michigan working with ten community colleges in Southeastern Michigan. The system was intended to demonstrate the effectiveness of providing extensive services directly to local organizations on a wide range of domestic problems which can benefit from information developed by federally sponsored research and development. Business expansion and new job opportunities in Michigan were emphasized. GRA

N79-27027# Office of Technology Assessment, Washington, D. C.
ANNUAL REPORT TO THE CONGRESS FOR 1978
1978 117 p refs
(PB-293088/1; OTA-A-85) Avail: NTIS HC A06/MF A01 CSCL 05A

The Office of Technology Assessment's annual report contains the following sections: (1) director's statement; (2) summaries of OTA reports completed in 1978; (3) assessment group activies; (4) the priorities process and (5) organization and operations. GRA

N79-27028# City-Wide Development Corp., Dayton, Ohio.
CITY-WIDE DEVELOPMENT CORPORATION DEVELOP-

MENT SERVICES PACKAGE Final Report
Mar. 1979 166 p refs
(Grant EDA-06-06-01341)
(PB-292972/7; EDA-79-029) Avail: NTIS HC A08/MF A01 CSCL 13B

Technical studies performed to identify economic development opportunities for the city of Dayton, Ohio are discussed. Emphasis is placed on creation of employment and tax base and the significance of the project's contribution toward encouraging the stability of the city's neighborhoods. J.M.S.

N79-27029# Transportation Research Board, Washington, D. C.
HIGHWAY CAPACITY, MEASURES OF EFFECTIVENESS, AND FLOW THEORY
Bo E. Peterson, Arne Hansson, Karl-Lennart Bang, Robert C. Blumenthal, and Jack A. Hutter 1978 91 p refs
(PB-292763/0; TRB/TRR-667) Avail: NTIS HC A05/MF A01 CSCL 13B

Contents: Swedish capacity manual; weighing vehicles in motion; estimation of left-turn saturation flows; signal cycle length and fuel consumption and emissions; traffic conflicts as a diagnostic tool in high safety; design considerations of traffic conflict surveys; analysis of traffic conflicts and collisions; evaluating highway guide signing; macroscopic simulation models for use in traffic systems management; and some properties of freeway density as a continuous-time, stochastic process. GRA

N79-27030# Patent and Trademark Office, Washington, D. C. Office of Technology Assessment and Forecast.
TECHNOLOGY ASSESSMENT AND FORECAST REPORT
Dec. 1977 191 p
(PB-293380/2) Avail: NTIS HC A09/MF A01 CSCL 05B

In order to stimulate and enhance the use and usability of the classified patent search file which contains twenty two million technological documents, and to assemble, analyze and make available meaningful data about the file, the Patent and Trademark Office compiled a master data base covering all U.S. patents which it periodically updates. The data base is used in the preparation as well as periodically issued general distribution publications in the preparation of special reports, tailored to individual needs. These reports, which are provided on a cost reimbursable basis are utilized by other government agencies and a number of private sector organizations. GRA

N79-27031# Environmental Protection Agency, Washington, D. C.
NATIONAL CONFERENCE ON LESS COSTLY WASTEWATER TREATMENT SYSTEMS FOR SMALL COMMUNITIES Final Report
Douglas M. Costle, Jennings Randolph, Keith H. Dearth, Marilyn W. Klein, Michael R. Alford, Gary D. Plews, James F. Hudson, James L. Gamble, Theodore C. Williams, Terry Bounds et al Apr. 1978 118 p refs Conf. held at Reston, Va., 12-14 Apr. 1977
(PB-293254/9; EPA-600/9-79-010) Avail: NTIS HC A06/MF A01 CSCL 13B

The focus of the conference was on sound and economical alternatives to conventional centralized wastewater collection and treatment systems for small communities. Discussion included present governmental policy on wastewater facilities, and descriptions of major types of conveyance and treatment systems (with comparative costs). Examples were provided of successful and cost-effective installations which meet environmental requirements. Alternative organizations for maintaining and operating small facilities were also discussed. GRA

N79-27032# Southern California Association of Governments, Los Angeles.
DRAFT SCAG-78 GROWTH FORECAST POLICY
Dennis Masyczek, Charles Noval, John Oshimo, and Gordon Palmer Aug. 1978 92 p refs Sponsored in part by Urban Mass Transportation Admin., Washington, D. C. and California State Office of Planning and Res., Sacramento
(Grant HUD-CPA-CA-1050.305)
(PB-293245/7) Avail: NTIS HC A05/MF A01 CSCL 13B

The Growth Forecast policy is prepared as a major new revision in the on-going Development Guide Program at SCAG. The Development Guide Program provides framework for coordinating local and regional decisions regarding growth. The Draft SCAG-78 Growth Forecast shows the SCAG region's population growing from 10.5 million in 1976 to 13.5 million in the year 2000. The forecasted total is based on assumptions of probable migration and fertility rates and does not represent any limitation of the regional total due to policy consideration. The regional total represents a summation of county figures that were developed with the planning states of each county. Draft SCAG-78 was designed in the context of Committee and Hearing Board recommendations. GRA

N79-27033# Texas A&M Univ., College Station.
PYROGENIC ACTIVITY OF CARBON-FILTERED WATERS Final Report
Harold W. Wolf, Bennie Joe Camp, Scott J. Hawkins, and James H. Jorgensen (Texas Univ. Health Science Center, San Antonio) Feb. 1979 125 p refs
(Grant EPA-R-804420)
(PB-293172/3; EPA-600/1-79-009) Avail: NTIS HC A06/MF A01 CSCL 13B

The endotoxin content and pyrogenic response of granular activated carbon (GAC) filtered waters were studied. Samples obtained from 27 different water supplies in the U.S. that utilize GAC adsorption contained free endotoxin ranging from 1.2-25 micrograms/l but none gave a pyrogenic response. No relationship was discernible between endotoxin content and pyrogenic response. Small removals of total organic carbon (TOC) by GAC beds which had been in operation in water treatment plants without regeneration for as long as 110 months were observed. However, 5 of 28 samples showed an increase in TOC through GAC and 8 of 28 samples showed an increase in standard plate count. GRA

N79-27034# New Hampshire Univ., Durham. Water Resources Research Center.
FATE OF METAL IONS DURING DOMESTIC TREATMENT OF WATER CONTAINING ORGANICS
James H. Weber and Ralph E. Truitt Feb. 1979 37 p refs
(Contract DI-14-31-0001-3829)
(PB-293147/5; RR-21; W79-05046; OWRT-A-046-NH(1)) Avail: NTIS HC A03/MF A01 CSCL 13B

Several filter media were tested to determine Cd(+2) losses during filtration at pH 8. Polycarbonate filter membranes in combination with a polycarbonate support apparatus gave the lowest Cd(+2) losses when the filtrate is collected directly in a volumetric flask. The effectiveness of metal ion removal from solution by alum coagulation was measured with fulvic acid present and absent. A factorial experimental design and analysis of variance were used to determine the effect on metal ion removal of the individual variables pH, metal ion concentration, alum concentration, and fulvic acid concentration and their combinations. Maximum metal ion losses of 96 percent for Cu(+2), 59 percent for Cd(+2), and 82 percent for Zn(+2) were measured in the presence of fulvic acid. GRA

N79-27035# Tennessee Univ., Knoxville. Water Resources Research Center.
EVALUATION OF THE EFFECTS OF URBANIZATION ON STORMWATER RUNOFF AND QUALITY
Donald E. Overton, Roger A. Minear, William L. Troxler, Richard S. Brown, and Ernest C. Crosby 30 Sep. 1978 206 p refs
(Contract DI-14-34-0001-8045)
(PB-293513/8; W79-05400; OWRT-A-046-TENN(3)) Avail: NTIS HC A10/MF A01 CSCL 13B

Results of an analysis of stormwater runoff and quality from four small urban watersheds in Knoxville, Tennessee, are presented. The mathematical models developed in the course of the study for simulating storm hydrographs, suspended sediment pollutographs and loads, and sediment delivery ratios are also presented. There is apparently a wide range of effects of dustfall and urban stormwater quality on a contaminant-by-contaminant basis. Certain constituents such as COD, Hg, Cl, Pb, SiO2, PO4, and As, significantly influence stormwater quality. Likewise COD, Hg, Cl, As, and PO4 levels found in the stormwater are caused primarily by dustfall. There are two distinct but overlapping groups of contaminants found in the urban watershed. One group is the minerals and solids which have relatively constant concen-

trations from storm to storm and the other group is heavy metals, nutrients, and COD which have decreasing concentration with increasing runoff. GRA

N79-27036# SRI International Corp., Menlo Park, Calif.
MANAGEMENT OF FEDERAL R AND D FOR COMMERCIALIZATION: EXECUTIVE SUMMARY
Norman B. McEachron, Harold S. Javitz, Donald S. Green, John D. Logsdon, and Egils Milbergs Sep. 1978 19 p 3 Vol.
(Contract NBS-5-35889)
(PB-292851/3; NBS-GCR-ETIP-78-57) Avail: NTIS HC A02/MF A01; also available in set of 3 reports HC E08 as PB-292850-SET CSCL 05A

Commercial acceptability of Federal research and development is considered along with technical success. Specific topics discussed include current policies and practices of Federal agencies regarding the management of Federally funded research and development and recommendations for policies and practices that would improve the commercialization of Federally funded research and development results. GRA

N79-27037# SRI International Corp., Menlo Park, Calif.
MANAGEMENT OF FEDERAL R AND D FOR COMMERCIALIZATION Final Report
Norman B. McEachron, Harold S. Javitz, Donald S. Green, John D. Logsdon, and Egils Milbergs Sep. 1978 143 p refs 3 Vol.
(Contract NBS-5-35889)
(PB-292852/1; NBS-GCR-ETIP-78-58) Avail: NTIS HC A07/MF A01; also available in set of 3 reports HC E08 as PB-292850-SET CSCL 05A

Management of Federally funded research and development programs intended for non-Federal application is considered. Emphasis is placed on commercial acceptability of research and development results. GRA

N79-27038# SRI International Corp., Menlo Park, Calif.
MANAGEMENT OF FEDERAL R AND D FOR COMMERCIALIZATION: APPENDICES: SUPPORTING DOCUMENTATION
Norman B. McEachron, Harold S. Javitz, Donald S. Green, John D. Logsdon, and Egils Milbergs Dec. 1978 175 p 3 Vol.
(Contract NBS-5-35889)
(PB-292853/9; NBS-GCR-ETIP-78-58A) Avail: NTIS HC A08/MF A01; also available in set of 3 reports HC E08 as PB-292850-SET CSCL 05A

An empirical investigation of Federal/civilian research and development management practices is documented. Planning, developing, and implementing research and development programs whose results are intended for commercialization by the non-Federal private sector are emphasized. GRA

88 SPACE SCIENCES (GENERAL)

No abstracts in this category.

89 ASTRONOMY

Includes radio and gamma-ray astronomy; celestial mechanics; and astrometry.

N79-27039 Massachusetts Univ., Amherst.
A STUDY OF THE PULSAR IN A BINARY SYSTEM Ph.D. Thesis
Lee Allen Fowler 1979 163 p
Avail: Univ. Microfilms Order No. 7912683

PSR 1913+16 was observed extensively at radio frequencies for purposes of better understanding the pulsar and the binary system of which it is a member. After a brief review of the salient characteristics of pulsars and of the binary pulsar, the data acquisition procedure is discussed. The data reduction computer programs and the least squares fit method are described, by which pulse arrival times are used to produce estimates of the pulsar and orbital values and formal errors. A table of best available estimates is presented. Flux density measurements of the radio radiation at 430 MHz and 1420 MHz are presented. A method for determining and independently checking the individual masses of the system components is described, and preliminary calculations presented. Proposed evolutionary scenarios of the system are summarized and their contribution to the understanding of the companion's stellar type evaluated. Dissert. Abstr.

N79-27040 Boston Univ., Mass.
INVESTIGATIONS OF DISTANT FIELD STARS AND CLUSTERS IN THE GALACTIC ANTICENTER Ph.D. Thesis
Carol Ann Christian 1979 233 p
Avail: Univ. Microfilms Order No. 7912132

UBV photometry of 197 stars in the cluster Be21 was derived from photoelectric measurements, iris photometry and photographic data obtained with the Kron electronic camera. The cluster is highly reddened and extremely distant, 10-15 kpc from the sun or 20-25 kpc from the galactic center. Since Be21 is quite young, its presence in the outer most part of the galactic plane suggests that this region, just now condensing, currently may be the site of active star formation. The properties of cool stars in a galactic anticenter field were investigated and compared to solar neighborhood stars. The factor analysis showed the presence of a maximum of three factors measured by 27 scamper points with 20A bandwidths. From the adopted parameters, the approximate reddening and distance modulus of each star was determined, and the general spatial distribution of stars for this field was derived. Dissert. Abstr.

N79-27041 New York Univ., N. Y.
THE APPLICATIONS OF THE GISS VIDICON SYSTEM: SELECTED TOPICS IN ASTROPHYSICS Ph.D. Thesis
Sheng-Huei Chang 1979 224 p
Avail: Univ. Microfilms Order No. 7913119

Three different parts are included. The first part deals with the GISS Vidicon system in some detail, also the data reduction method is discussed. In the second part, semiempirical model chromospheres are proposed for the stars Capella, Pollux and Aldebaran. The third part proposes a model to solve the interstellar elements depletion problem. Dissert. Abstr.

N79-27042 Iowa Univ., Iowa City.
HIGH ANGULAR RESOLUTION OBSERVATIONS OF THE CIRCUMSTELLAR OH MASERS SURROUNDING SUPERGIANT STARS Ph.D. Thesis
John Mark Benson 1978 216 p
Avail: Univ. Microfilms Order No. 7912832

Very Long Baseline Interferometry observations of the hydroxyl (OH) maser emissions in the circumstellar clouds surrounding IRC + 10420, NML Cygni and VY Canis Majoris were conducted in April and October 1977. The maser features in the NML Cyg 1612 MHz spectrum are approximately 0.04 arcseconds in diameter and are distributed over a region of about 1.8 x 3.2 arcseconds. The VY CMa 1612 MHz spectral features are about 0.03 arcseconds in diameter and distributed over an area of 1.8 x 1.8 arcseconds. Peak brightness temperatures of masers in both sources are 10 to the 11th power K. The NML Cyg and VY CMa 1612 MHz maps show similar structure. The features in the IRC + 10420 1612 MHz spectrum have angular sizes of approximately 0.03 arcseconds and the peak brightness temperature is 3 x 10 to the 10th power K. Masers that have recently flared up in the IRC + 10420 1612 MHz spectrum were mapped and indicate a circumstellar shell diameter of about 0.8 arcseconds. Dissert. Abstr.

N79-27043*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
THE SPACE TELESCOPE OBSERVATORY
John N. Bahcall (Institute for Advanced Study, Princeton, N. J.) and C. R. ODell Jun. 1979 45 p refs
(NASA-TM-78301) Avail: NTIS HC A03/MF A01 CSCL 03A

A convenient guide to the expected characteristics of the

Space Telescope Observatory for astronomers and physicists is presented. An attempt is made to provide enough detail so that a professional scientist, observer or theorist, can plan how the observatory may be used to further his observing programs or to test theoretical models. G.Y.

N79-27044*# Cornell Univ., Ithaca, N. Y. Dept. of Astronomy.
AIRBORNE INFRARED AND SUBMILLIMETER ASTRONOMICAL POLARIZATION MEASUREMENTS AT DIFFERENT WAVELENGTHS Final Technical Report, 1 Oct. 1977 - 31 Dec. 1978
Martin Harwit Jul. 1979 7 p refs
(Grant NsG-2262)
(NASA-CR-158751) Avail: NTIS HC A02/MF A01 CSCL 03A

Because observations of the Kleinmann-Low region of the Orion Nebula reveal significant polarization in the wavelength range from 1 to 13 micron m, polarization at wavelengths greater than 15 micron were investigated. Far infrared polarization measurements were made of a number of sources using an instrument mounted at the bent cassegrain focus of the Kuiper Airborne Observatory's 90 cm telescope. About two hours of data were obtained on the Orion Nebula on each of two flights, and more careful calibration on Jupiter (assumed to be unpolarized) were obtained on both nights. The data on Orion and Jupiter for three filters are presented. Possible explanations are suggested for reconciling the high polarization observed by others in 1974 with the lower values obtained in this study. A.R.H.

N79-27045*# Texas Univ. at Austin. Dept. of Astronomy.
VARIABILITY OF LYMAN-ALPHA EMISSION FROM JUPITER Final Report
1979 19 p refs
(Grant NsG-5236)
(NASA-CR-158756) Avail: NTIS HC A02/MF A01 CSCL 03A

The Jovian Lyman-alpha emission line was again observed in 1978 using the high resolution spectrometer on the Copernicus satellite. In intensity of 8.4+3.0 kilo Rayleighs was measured. This value represents a significant increase in intensity over previous (1976) Copernicus observations, but is lower than the recent (1979) values obtained by Voyager I and IUE. The increase in intensity was accompanied by a significant increase in line width, giving strong support to the theory that the emission results from resonant scattering of the solar Ly-alpha line by H atoms in the upper Jovian atmosphere. The strength of Jovian Ly-alpha emission correlates well with the level of solar activity. The solar extreme ultraviolet radiation varies with the solar cycle. This radiation causes the dissociation of H2 and CH4 into H atoms in the Jovian atmosphere. Therefore, in times of high solar activity, the H column density will increase, causing the observed stronger Jovian Ly-alpha emission. Author

N79-27046# Royal Observatory, Edinburgh (Scotland).
THE UK 1.2m SCHMIDT TELESCOPE AND THE SOUTHERN SKY SURVEY. PART 2: PHOTOGRAPHIC TECHNIQUES
R. D. Cannon, T. G. Hawarden, M. E. Sim, and S. B. Tritton 1978 21 p refs
(ROE-OR-4-Pt-2; ISSN-0309-099X) Avail: NTIS HC A02/MF A01

The production of photographic plates for the UK 1.2 m Schmidt Telescope is described, with particular reference to IIIaJ plates taken for the ESO/SRC Southern Sky Survey. Four main topics are covered: pre-exposure hypersensitization, exposure in the telescope, processing, and quality control. The acceptance criteria for the sky survey and the grading code which summarizes the quality of each plate are described in detail. Author (ESA)

90 ASTROPHYSICS

Includes cosmology; and interstellar and interplanetary gases and dust.

N79-27047 Illinois Univ. at Urbana-Champaign, Urbana.
THE SOLUTION OF TWO DIMENSIONAL PROBLEMS IN ASTROPHYSICS Ph.D. Thesis
Bruce Alan Fryxell 1978 172 p
Avail: Univ. Microfilms Order No. 7913461

Techniques for studying the general hydrodynamic behavior of problems in two dimensional cylindrical coordinates with rotational symmetry are discussed. The hydrodynamic behavior of off-center point explosions in stars is considered. An important application of these calculations is the possible formation of high velocity pulsars. Unless a supernova mechanism can be found which is able to produce enough energy in a small region of the star, off-center explosions do not provide a satisfactory explanation for high velocity pulsars. Research to determine whether the impact of an expanding supernova shell on a binary companion star can disrupt the binary system is presented. It is unlikely that the collision between the supernova shell and the companion star will have a significant effect on the orbit of the binary system except perhaps in a few extreme cases.
Dissert. Abstr.

N79-27048 Stanford Univ., Calif.
PARTICLE ACCELERATION IN PULSAR MAGNETOSPHERES Ph.D. Thesis
Kile Barton Baker 1979 77 p
Avail: Univ. Microfilms Order No. 7912337

A theorem which shows that particle acceleration cannot be expected when the angle between the magnetic field lines and the rotation axis is constant is described. If this angle is not constant, however, acceleration must occur. A realistic model of an axisymmetric neutron star with a strong dipole magnetic field aligned with the rotation axis is investigated. Acceleration occurs at large distances from the surface of the star. The magnitude of the current is determined from this model. In the case of nonaxisymmetric systems, the acceleration is expected to occur nearer the surface of the star. Dissert. Abstr.

N79-27049*# Cornell Univ., Ithaca, N. Y. Center for Radiophysics and Space Research.
GRAVITATIONAL TIME DELAY IN ORTHOGONALLY POLARIZED RADIATION PASSING BY THE SUN Final Technical Report, 1 Sep. 1976 - 31 Aug. 1978
Martin Harwit Jun. 1979 8 p ref
(Grant NsG-7268)
(NASA-CR-158757) Avail: NTIS HC A02/MF A01 CSCL 03B

Two parallel investigations into the degree, if any, to which orthogonally polarized rays are deflected differently on passing through the gravitational field of the sun were previously conducted. The first involved very long and intermediate length baseline radio interferometry. The second was initially based on observations of radiation transmitted by the Pioneer 6 spacecraft, on passing behind the sun in 1968. This work was extended by using Helios-A and Helios-B spacecraft. It was calculated that the differential deflection between orthogonally polarized components is less than one part in 10 to the 7th power of the total gravitational deflection, or less than about 10 to the -7th power arc sec, in total. G.Y.

N79-27050# Laboratorio di Ricerca e Technologia per lo Studio del Plasma nello Spazio, Frascati (Italy).
THE dc MAGNETIC FIELD OBSERVATIONS AT THE EARTH'S BOW SHOCK
U. Villante (Univ. of l'Aquila, Italy) Jun. 1978 17 p refs Presented at 5th European Geophys. Soc. Meeting, Strasbourg, 1978
(LPS-78-5) Avail: NTIS HC A02/MF A01

Bow shock observations were organized into two major classes of quasi-perpendicular and quasiparallel structures (according to the value of the angle theta between the normal to the shock surface and the interplanetary magnetic field). Quasi-perpendicular (theta $>$ 50 deg) encounters were identified by monotonic sharp transitions of the magnetic field. The ratio of field magnitudes on the two sides of the shocks ranged between 2 and 4 in the near earth region. A small amplitude precursor wave was often observed in the upstream region. Quasiparallel encounters (theta $<$50 deg) were accompanied by periodic fluctuations of the magnetic field whose amplitude was often so large that it was comparable with the expected shock gradient. Distant observations confirm the existence of a regular shock structure up to the

equivalent of 440 earth radii downstream from the earth. Locations of the shock encounters are in good agreement with the usual gasdynamic models. Author (ESA)

91 LUNAR AND PLANETARY EXPLORATION

Includes planetology; and manned and unmanned flights.

For spacecraft design see *18 Spacecraft Design Testing, and Performance*. For space stations see *15 Launch Vehicles and Space Vehicles*.

N79-27051*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
PROPORTIONAL COUNTER FOR X-RAY ANALYSIS OF LUNAR AND PLANETARY SURFACES Final Report, 1 May 1976 - 30 Jun. 1977
Jul. 1979 14 p refs
(Grant NsG-7177)
(NASA-CR-158754) Avail: NTIS HC A02/MF A01 CSCL 03B

A position sensitive proportional scintillation detector was developed and evaluated for use in applications involving X-ray imaging as well as spectroscopy. Topics covered include limitations of the proportional scintillation counter for use in space; purification of the xenon gas in the detector, and the operation of the detector system. Results show that the light signal in a proportional scintillation detector remains well localized. With modest electric fields in xenon, the primary electrons from a photoelectric absorption of an X-ray can be brought a distance of a few millimeters to a higher field region without spreading more than a millimeter or so. Therefore, it is possible to make a proportional scintillation detector with good position sensitivity that could be used to calibrate out the difference in light collection over its sensitive volume. A.R.H.

N79-27052# Technische Universitaet, Munich (West Germany). Lehrstuhl fuer Raumfahrttechnik.
AN ENCOUNTER WITH HALLEY'S COMET AT 24 KM PER SECOND
Arno Boehme (Univ. of Ger. Armed Forces, Munich-Neubiberg, West Ger.), Wolfgang Dittberner, Johannes Doll (Univ. of Ger. Armed Forces, Munich-Neubiberg, West Ger.), Klaus Schwenzfeger (Univ. of Ger. Armed Forces, Munich-Neubiberg, West Ger.), and Ernst Stuhlinger 28 Aug. 1978 27 p refs
(TUM-LRT-TB-78/5) Avail: NTIS HC A03/MF A01

A shuttle-launched, electrically propelled spacecraft is described which gains sufficient velocity inside the earth's orbit to encounter Comet Halley on its retrograde orbit with a relative velocity below 25 km/sec at a solar distance of 2.3 AU. Launched in April of 1985 with 100 kg of scientific instruments, the proposed spacecraft would meet the comet on its outbound leg 129 days after perihelion. Author (ESA)

92 SOLAR PHYSICS

Includes solar activity, solar flares, solar radiation and sunspots.

N79-27053*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAGNETIC DIPS IN THE SOLAR WIND
M. Dobrowolny, B. Bavassano, F. Mariani, N. Ness, and L. Burlaga Frascati, Italy Sep. 1978 36 p refs Prepared in cooperation with Laboratorio di Ricerca e Technologia per lo Studio del Plasma Nello Spazio, Frascati, Italy
(NASA-TM-80477; LPS-78-7) Avail: NTIS HC A03/MF A01 CSCL 03B

Using magnetic data from the HELIOS 1 fluxgate magnetometer, with a 0.2 sec resolution, the structures of several interplanetary discontinuities involving magnetic dips and rotations of the magnetic field vector were investigated. A minimum variance analysis illustrates the behavior of the magnetic field through the transition in the plane of its maximum variation. Using this analysis, quite different structures have been individuated and, in particular, narrow transitions resembling almost one dimensional reconnected neutral sheets. For the thinner cases (scale lengths of the magnetic rotation of the order or smaller than 1,000 km), results show the observed structures could be the nonlinear effect of a resistive tearing mode instability having developed on an originally one dimensional neutral sheet at the solar corona. Author (ESA)

N79-27054# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 414 (SUPPLEMENT), FEBRUARY 1979. PART 1: PROMPT REPORTS. DATA FOR DECEMBER 1978 - JANUARY 1979
Helen E. Coffey Feb. 1979 177 p 3 Vol.
(PB-294770/3; SGD-414-Pt-1; NOAA-79031606) Avail: NTIS HC A09/MF A01 CSCL 03B

Data are provided for January 1979 on: alert period, daily solar indexes, solar flares, solar radio waves, solar X-ray radiation, coronal holes, spacecraft observations, solar wind measurements, inferred IP magnetic field polarities, mean solar magnetic field and Boulder geomagnetic substorm log. Data for December 1978 on daily solar activity center, sudden ionospheric disturbances, solar X-ray radiation, solar radio waves, cosmic rays, geomagnetic indexes and radio propagation indexes are included. GRA

N79-27055# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 414 (SUPPLEMENT), FEBRUARY 1979. PART 2: COMPREHENSIVE REPORTS. DATA FOR AUGUST - JULY 1978 AND MISCELLANEA
Helen E. Coffey Feb. 1979 70 p 3 Vol.
(PB-294771/1; SGD-414-Pt-2; NOAA-79031607) Avail: NTIS HC A04/MF A01 CSCL 03B

Data are provided for August 1978 on: active regions, synoptic solar maps, solar flares, solar radio waves and energetic solar particles and plasma. A synoptic chart, abbreviated calendar record, and regional flare index for July 1978 are included. The miscellaneous data include: solar wind measurements, solar radio waves, cosmic rays--alert and Deep River November 1978, and solar-terrestrial activity 1976. GRA

N79-27056# National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.
SOLAR-GEOPHYSICAL DATA NUMBER 414 (SUPPLEMENT), FEBRUARY 1979: EXPLANATION OF DATA REPORTS
Feb. 1979 92 p 3 Vol.
(PB-294772/9; SGD-414; NOAA-79031608) Avail: NTIS HC A05/MF A01 CSCL 03B

Solar geophysical data is intended to keep research workers informed on a timely schedule of the major events of solar activity and the associated interplanetary, ionospheric, radio propagation, and other geophysical effects. This report series is made possible through the cooperation of many observatories, laboratories, and agencies as recorded in the detailed descriptions. GRA

93 SPACE RADIATION

Includes cosmic radiation and inner and outer earth's radiation belts.

For biological effects of radiation see *52 Aerospace Medicine*. For theory see *73 Nuclear and High-Energy Physics*.

N79-27057*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
CATALOG OF FAR-ULTRAVIOLET OBJECTIVE-PRISM SPECTROPHOTOMETRY: SKYLAB EXPERIMENT S-019, ULTRAVIOLET STELLER ASTRONOMY
K. G. Henize, J. D. Wray, S. B. Parsons, and G. F. Benedict May 1979 545 p refs Prepared in cooperation with Texas

Univ. at Austin
(Contracts NAS9-13176; NAS8-13176; NAS8-31459; Grant NsG-7371)
(NASA-RP-1031; S-495) Avail: NTIS HC A03/MF A01 CSCL 03B

Ultraviolet stellar spectra in the wavelength region from 1300 to 5000 A (130 to 500) were photographed during the three manned Skylab missions using a 15 cm aperture objective-prism telescope. The prismatic dispersion varied from 58 A mm/1 at 1400 A to 1600 A mm/1 at 3000 A. Approximately 1000 spectra representing 500 stars were measured and reduced to observed fluxes. About 100 stars show absorption lines of Si IV, C IV, or C II. Numerous line features are also recorded in supergiant stars, shell stars, A and F stars, and Wolf-Rayet stars. Most of the stars in the catalog are of spectral class B, with a number of O and A type stars and a sampling of WC, WN, F and C type stars. Spectrophotometric results are tabulated for these 500 stars. Author

N79-27058# Kiruna Geophysical Inst. (Sweden). Dept. of Space Physics.
EXPECTED MUON SPECTRA AT TWO DIFFERENT LATITUDES
Kjell Aastroem (Umeaa Univ., Swed.) Apr. 1977 11 p refs Sponsored jointly by Swed. Natural Sci. Res. Council, Uppsala Univ. and Labor Market Board
(KGI-77-2) Avail: NTIS HC A02/MF A01

Calculated muon spectra were compared with measurements made with the same instrument at two different latitudes. The comparison was made in two approximations, one underestimating the total latitude effect and one overestimating it. The measurements coincided with the results of what was considered the best approximation. The total latitude effect was separated into geomagnetic and temperature latitude effects. These two effects are separable to a high degree of approximation. The importance of such comparisons between calculated integrated quantities and experiments are obvious since they form the basis for deriving coupling functions, specific yield functions, or variational coefficients also in energy regions not accessible to experiments. Author (ESA)

N79-27059# National Technical Information Service, Springfield, Va.
COSMIC RAYS, VOLUME 1. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1973 - 1976
Brian Carrigan May 1979 258 p 2 Vol.
(NTIS/PS-79/0386/7) Avail: NTIS HC $28.00/MF $28.00 CSCL 04A

Measurement techniques, isotopic composition, distribution, intensity, anisotropy, and sources of cosmic rays are covered in the citations. This updated bibliography contains 251 abstracts, none of which are new to the previous edition. GRA

N79-27060# National Technical Information Service, Springfield, Va.
COSMIC RAYS, VOLUME 2. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1977 - Apr. 1979
Brian Carrigan May 1979 60 p Supersedes NTIS/PS-78/0406; NTIS/PS-77/0427; NTIS/PS-76/0328; NTIS/PS-75/134 2 Vol.
(NTIS/PS-79/0387/5; NTIS/PS-78/0406; NTIS/PS-77/0427; NTIS/PS-76/0328; NTIS/PS-75/134) Avail: NTIS HC $28.00/MF $28.00 CSCL 04A

Measurements of cosmic radiation obtained by instruments on the ground, or by those borne by balloon or satellite are discussed in 53 reports cited in this bibliography. All entries are new to the previous edition. A.R.H.

99 GENERAL

N79-27061# Council for Scientific and Industrial Research, Pretoria (South Africa).
CSIR ANNUAL REPORT, 1978
1979 76 p
(AR-34) Avail: NTIS HC A05/MF A01

Activities directed toward the identification of key technologies required for the social, economic, and industrial development of the Republic of South Africa are reported. Particular emphasis is given to the establishment of data bases for the chemical industry, programs for the conservation of energy and the protection of the environment and the nation's resources, and the computer-aided compilation of a textile dictionary in English and Africaans. Topics covered include the reduction of data from Meteosat, LANDSAT, and Nimbus-6 satellites for resource management and weather forecasting; the preparation of retrospective bibliographies and other literature searching activities; the development of integrated circuits; mechanical stress investigations for the lumber industry; the herbicidal control of water hyacinths; packaging for the sorghum beer and food processing industries toxic hazards; and environmental monitoring. A.R.H.

N79-27062# Technical Research Centre of Finland, Espoo.
[ACTIVITIES OF THE TECHNICAL RESEARCH CENTER OF FINLAND] Annual Report, 1977
1978 36 p
Avail: NTIS HC A02/MF A01

Organization, budget, present activities, and programs are briefly reviewed. The main divisions of the research center are building technology and community development, materials and processing technology, and electrical and nuclear technology. Author (ESA)

N79-27063# Institut d'Aeronomie Spatiale de Belgique, Brussels.
SPACE ACTIVITIES IN 1977 Annual Report [ACTIVITIES SPATIALES EN 1977]
1977 21 p refs In FRENCH
Avail: NTIS HC A02/MF A01

The space activities of Belgian research centers are described. Some experiments which will be pat of the first Spacelab payload were simulated. Research was done on the stratosphere, the magnetosphere, and on the solar wind. A new method for studying solar wind interaction with planetary magnetosphere was derived. Besides stellar and atmospheric studies, laboratory work was performed in optics relative to the space telescope. Author (ESA)

N79-27064# Joint Publications Research Service, Arlington, Va.
TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY: PHYSICAL SCIENCES AND TECHNOLOGY, NO. 72
12 Jun. 1979 79 p refs Transl. into ENGLISH from various Russian journals
(JPRS-73663) Copyright. Avail: NTIS HC A05/MF A01

The limitations of current program used in computerized design are discussed as well as the use of integrated design systems in Soviet industries. The recent history of discoveries in underwater topography is reviewed and the theory of global tectonics is examined. For individual titles, see N79-27065 through N79-27067.

N79-27065# Joint Publications Research Service, Arlington, Va.
INTEGRATED SYSTEMS: A MODERN TREND IN THE DEVELOPMENT OF AUTOMATED DESIGN SYSTEMS c33
M. A. Gavrilov *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 72 (JPRS-73663) 12 Jun. 1979 p 9-12 refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 1, Jan. 1979 p 3-4 (For primary document see N79-27064 17-99)
Copyright. Avail: NTIS HC A05/MF A01

Until recently, the development of automated design systems software was based on the creation of packages of applied programs that required the running of individual programs containing complexes of programs aimed at automating the design of specific objects. However, because this form of software formulation did not yield the necessary software universality and vitality and led to the repetition of a number of developments that are invariant in different problems, thus causing excessive expenditures for the creation of software, systems developers found it necessary to integrate the packages of applied programs and used them to create integrated automated design systems: such systems are suitable for circulation and take into considera-

tion the broad diversity of the parameters of objects being designed in certain classes, as well as the diversity of the languages used to describe these parameters, and the forms in which the design documentation is presented. The application of automated design systems in the Soviet microelectronics industry is reviewed. A.R.H.

N79-27066# Joint Publications Research Service, Arlington, Va.

PRINCIPLES OF THE CONSTRUCTION OF A NEW GENERATION OF SAPR'S **c61**

L. A. Rychkov and B. A. Kuzmin *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 72 (JPRS-73663) 12 Jun. 1979 p 13-24 refs Transl. into ENGLISH from Prib. Sist. Upr. (Moscow), no. 1, Jan. 1979 p 4-7 (For primary document see N79-27064 17-99)

Avail: NTIS HC A05/MF A01

The inadequacies of existing programs for designing printed card circuits are examined as well as basic trends in the development of automated design systems. Principles to be considered for the construction of more useful systems include universality, adaptability, full monitoring, interpretation of errors, system productivity, and the use of specialized data bases. The Monika system which includes a complex of design automation facilities making it possible to carry out the design process from the input of the initial information to the output of design specifications (texts, drawings, templates) is described. With Monika, the user interacts with the system by means of the assignment language control and the user-system dialog language. A.R.H.

N79-27067# Joint Publications Research Service, Arlington, Va.

RELIEF OF THE OCEAN FLOOR AND THE NEW GLOBAL TECTONICS **c46**

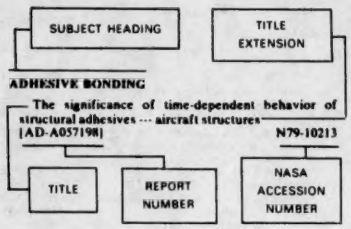
A. V. Ilin *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 72 (JPRS-73663) 12 Jun. 1979 p 61-74 refs Transl. into ENGLISH from Priroda (Moscow), no. 3, Mar. 1979 p 93-102 (For primary document see N79-27064 17-99)

Copyright. Avail: NTIS HC A05/MF A01

Many features of the internal structure of the earth's crust are mirrored in the relief of the ocean floor. A broadened understanding of underwater topography, beginning with the discovery of midoceanic ridges, rift valleys, and magnetic anomalies, led to the theory of global tectonics. The principle tectonic elements of midoceanic ridges are examined and their bathymetric levels are compared with the age of oceanic basins. Contradictions can be mitigated by considering the idea that internal parts of lithospheric plates have tectonic mobility. It is concluded that the development of the oceanic morphostructure is related to the age of the crust. The older the crust is, the more contrast the morphostructure will have. The evolution of the oceanic morphostructure is determined by the zonality of tectonic processes. A.R.H.

SUBJECT INDEX

Typical Subject Index Listing



The subject heading is the key to the subject content of the document. Titles, report numbers, and accession numbers of pertinent documents are provided under each subject heading. When the title is insufficiently descriptive of the document content, a title extension has been added, separated from the title by three hyphens. The report number helps to indicate the type of document cited (e.g., NASA report, NASA translation, NASA contractor report). The NASA accession number is the number by which the document abstracts are arranged in this journal and by which the document is sold or requested. The titles, with title extensions if present, are arranged under each subject heading in ascending accession number order. The subject headings have been selected from the latest revision of the *NASA Thesaurus* (NASA SP-7050).

A

ABSORPTION SPECTRA
Energy levels and line intensities for the ground configuration of Pr3+ in LiYF4
[AD-A067845] N79-26140
Blank corrections for ultratrace atomic absorption analysis
[AD-A066979] N79-26893
AC GENERATORS
Commercial synchronous alternating-current generators
N79-26482
ACCELEROMETERS
On the development of strong-motion instrument networks in the United States
[PB-293579/9] N79-26612
ACCESSORIES
Quasi-optical elbows in circular waveguide connections
[FUB-39-1977] N79-26273
ACCUMULATORS
A dynamic crossed-field photomultiplier with an electron bombarded semiconductor collector
N79-26307
Preliminary wind tunnel simulation study of snow collection gauges
[UTIAS-TN-219] N79-26373
ACCURACY
Large Area Crop Inventory Experiment (LACIE). Signature extension in remote sensing
[E79-10219] N79-26446
ACETATES
Investigation of test methods, material properties, and processes for solar cell encapsulants
[NASA-CR-158741] N79-26494
ACOUSTIC EMISSION
Evaluation of the two-dimensional Fourier transform applied to acoustic image pattern measurements
[AD-A068017] N79-26888
ACOUSTIC MEASUREMENTS
The use of rhymed polysyllabic words in studying aural intelligibility indoors
[FUB-30-1977] N79-26270
Techniques of cumulative quantitative characterization of the thorax using audiosonic methods
N79-26769
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 1
[NASA-CR-159575-VOL-1] N79-26884
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 2
[NASA-CR-159575-VOL-2] N79-26885
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 3
[NASA-CR-159575-VOL-3] N79-26886
Manual audiometry: A comparison of two methods
[NPL-AC-88] N79-26890
ACOUSTIC NOZZLES
An evaluation of nozzle response to transient disturbances
N79-26355
ACOUSTIC PROPERTIES
Acoustic-to-seismic coupling properties and applications to seismic sensors
[AD-A067348] N79-26591
Techniques of cumulative quantitative characterization of the thorax using audiosonic methods
N79-26769
ACOUSTIC SOUNDING
Remote measurement of the atmospheric parameters, using a radioacoustic sounder
N79-26625
Acoustic radar and its use in meteorology
[TR-20] N79-26714
ACOUSTICS
An evaluation of linear acoustic theory for a hovering rotor
[NASA-TM-80059] N79-26881
ACOUSTO-OPTICS
A study of the acousto-optic effect in nematics as a means of acoustic field imaging
[AD-A067173] N79-26986
ACTIVATED CARBON
Pyrogenic activity of carbon-filtered waters
[PB-293172/3] N79-27033
ACTIVATED SLUDGE
Pyrogenic activity of carbon-filtered waters
[PB-293172/3] N79-27033
ACTIVATION ANALYSIS
A thermal activation analysis of cyclic creep in Al-4.6% Mg
N79-26418
ADAPTIVE CONTROL
A determination of the first two moments of the ale output detector
[AD-A067213] N79-26320
Experimental performance measurements of Adaptive Noise Canceller [ANC]: Various inputs and internal parameters correspond with existing theory
[AD-A067977] N79-26325
Adaptive allocation of decision making responsibility between human and computer in multitask situations
N79-26827
Stochastic and adaptive systems
[AD-A067598] N79-26830
Stable discrete adaptive control
[AD-A067812] N79-26831
ADAPTIVE OPTICS
Advanced multidither coat studies
[AD-A068005] N79-26932
ADDITIVES
Silicon oxide studies: Physical modeling and device applications of thermal oxidation of heavily doped silicon
N79-26300
Angular addressing properties of volume Fourier transform holograms in iron-doped lithium niobate
N79-26371
ADHESIVE BONDING
An investigation of the adhesive bonding of Teflon solar cell covers
[NASA-CR-159565] N79-26506
ADSORPTION
The decomposition of polycyclic organic matter adsorbed on coal fly ash
N79-26119
Ellipsometry as a tool to study the adsorption behavior of synthetic and biopolymers at the air-water interface
N79-26217
AEROACOUSTICS
Development of a test facility for investigating the relations between noise and inflow disturbance in an aircraft propulsion fan
[TT-7805] N79-26066
Aerodynamic sound generation due to vortex-aerofoil interaction. Part 2: Analysis of the acoustic field
[NASA-CR-152231] N79-26883
AERODYNAMIC CHARACTERISTICS
Comparison of theoretical predicted longitudinal aerodynamic characteristics with full-scale wind tunnel data on the ATLIT airplane
[NASA-CR-158753] N79-26018
Effects of wing leading-edge deflection on low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- wind tunnel tests
[NASA-TP-1434] N79-26020
Effect of nose bluntness and afterbody shape on aerodynamic characteristics of a monoplanar missile concept with bodies of circular and elliptical cross sections at a Mach number of 2.50
[NASA-TM-80055] N79-26023
Aerodynamic characteristics of the close-coupled canard as applied to low-to-moderate swept wings. Volume 2: Subsonic speed regime
[AD-A067122] N79-26025
Research programme on turbulent shear layers
[IC-AERO-78-105] N79-26032
Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067
The use of wind data with an operational wind turbine in a research and development environment
[NASA-TM-73832] N79-26502
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 1
[NASA-CR-159575-VOL-1] N79-26884
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 2
[NASA-CR-159575-VOL-2] N79-26885
acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 3
[NASA-CR-159575-VOL-3] N79-26886
AERODYNAMIC CONFIGURATIONS
Rotor redesign for a highly loaded 1800 ft/sec tip speed fan. 1: Aerodynamic and mechanical design report
[NASA-CR-159596] N79-26055
Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067
Feasibility study for a numerical aerodynamic simulation facility. Volume 1
[NASA-CR-152287] N79-26068
AERODYNAMIC DRAG
Assessment of an empirical technique for estimating vehicle aerodynamic drag from vehicle shape parameters
[PB-292160/9] N79-27025
AERODYNAMIC FORCES
Development of a research plan for the improvement of aerodynamic models for analysis of ballistic range data
[AD-A067950] N79-26029
AERODYNAMIC LOADS
Bumblebee program aerodynamic data. Part 3: Pressure fields at Mach numbers 1.5 to 2.0 --- for supersonic guided missiles
[NASA-CR-3116] N79-26021
AERODYNAMIC NOISE
Aerodynamic sound generation due to vortex-aerofoil interaction. Part 2: Analysis of the acoustic field
[NASA-CR-152231] N79-26883
AERODYNAMIC STABILITY
Preliminary airworthiness evaluation AH-1S helicopter equipped with a Garrett infrared radiation suppressor and an AN/ALQ-144 jammer
[AD-A067757] N79-26047
AERODYNAMIC STALLING
A study of the drooped leading edge airfoil --- on wind tunnel models to reduce spin entry after stall
[NASA-CR-158717] N79-26013
AERODYNAMICS
Summary of past experience in natural laminar flow and experimental program for resilient leading edge
[NASA-CR-152276] N79-26024
Numerical aerodynamic simulation facility feasibility study, executive summary
[NASA-CR-152284] N79-26071
Numerical aerodynamic simulation facility feasibility study
[NASA-CR-152285] N79-26072

AEROSOLS
Certain characteristics of the atmospheric turbidity
N79-26683
Stratospheric aerosols in the intertropical convergence zone, Panama Canal zone
N79-26725
AEROSPACE ENVIRONMENTS
General purpose rocket furnace
[NASA-CASE-MFS-23460-1] N79-26075
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Research Association
N79-26079
Technology advancement of the electrochemical CO2 concentrating process
[NASA-CR-152250] N79-26135
Modeling of the geosynchronous orbit plasma environment. Part 3: ATS-5 and ATS-6 pictorial data atlas
[AD-A067843] N79-26597
AEROSPACE MEDICINE
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 194
[NASA-SP-7011(194)] N79-26770
Index to FAA Office of Aviation Medicine reports: 1961 through 1978
[AD-A067983] N79-26773
AEROSPACE VEHICLES
Proceedings of workshops to define engineering requirements for a space vacuum research Facility: Summary
N79-26077
AFRICA
Recent and ice age climatic ecological arrangement of the African high mountains between the Mediterranean and the equator
N79-26656
AFTERBODIES
Jet simulation techniques: Simulation of temperature effects by altering gas composition
[AD-A067084] N79-26362
Computer program for calculation of separated turbulent flows on axisymmetric afterbodies including exhaust plume effects
[AD-A066925] N79-26363
AFTERBURNING
Alternate subsonic low-cost engine
[AD-A067277] N79-26058
AGGLOMERATION
Fuel contaminants, volume 4: Application of oil agglomeration to coal wastes
[PB-293210/1] N79-26236
AGING (MATERIALS)
Evolution of the properties and structure of 17Cr-13Ni-Mo very low carbon austenitic stainless steel during high temperature exposure --- fast nuclear reactors
N79-26188
AGRICULTURAL AIRCRAFT
System design requirements for advanced rotary-wing agricultural aircraft
[NASA-CR-158938] N79-26046
AGRICULTURE
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978 --- Colby, Kansas and Yuma, Colorado
[E79-10215] N79-26442
AIR CARGO
Boeing 747 aircraft with large external pod for transporting outsize cargo
[NASA-CR-159067] N79-26063
AIR CUSHION LANDING SYSTEMS
Air cushion landing gear applications study
[NASA-CR-159002] N79-26045
AIR DROP OPERATIONS
Air Deployed Oceanographic Mooring [ADOM]
[AD-A068001] N79-26755
AIR FLOW
Prediction of flow and heat transfer in internally finned tubes
N79-26343
Experiments heat transfer and pressure drop for an array of colinear interrupted plates
N79-26358
Zones of convergence in local air flow in valleys and basins
N79-26648
Preliminary report on planning of the GARP mountain sub-program [ALPEX]
N79-26710
AIR LAND INTERACTIONS
Wind characteristics over ridges
N79-26618
The mountain mass of Olympus as a heating source of the lower troposphere
N79-26688
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation
N79-26698
AIR POLLUTION
Fuel contaminants. Volume 3: Control of coal-related pollutants
[PB-293328/1] N79-26234
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 427 cubic inch 1977 California GMC 6500
[PB-293530/2] N79-26410
Characterizing dispersion on a climatological basis
[PNL-SA-6832] N79-26543
Detection and measurements of air pollutants and constituents by millimeter-wave microwave spectroscopy
[LBL-7986] N79-26544
Proceedings: Third Workshop on catalytic combustion
[PB-293336/4] N79-26548
Assessment of the use of fugitive emission control devices
[PB-292748/1] N79-26551
Characterization of the EPA/IERL-RTP pilot-scale precipitation
[PB-292820/8] N79-26555
Commuter exposure modeling methodologies --- to air pollution
[PB-292995/8] N79-26557
A history of air pollution meteorology through 1969
[PB-293741/5] N79-26559
Optical instrument for in-stack monitoring of particle size
[PB-292751/5] N79-26561
Level 1 environmental assessment performance evaluation
[PB-292931/3] N79-26564
Model of Advection, Diffusion and Chemistry of Air Pollution [MADCAP], evaluated at San Diego, air basin.
[PB-292526/1] N79-26565
Predictions of highway emissions by a second order closure model
[PB-292703/6] N79-26566
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 361 cubic inch 1966 Ford F-600
[PB-293529/4] N79-26567
Preliminary environmental assessment of the lignite-fired CAFB
[PB-293225/9] N79-26569
Air quality data for metals 1975 from the National Air Surveillance network
[PB-293106/1] N79-26570
Oxidant formulation in the generation of ozone
[PB-293269/7] N79-26571
Growth effects of major land use projects [wastewater facilities]. Volume 2: Summary, predictive equations and worksheets
[PB-293229/1] N79-26572
Washington state air monitoring data for 1977
[PB-293085/7] N79-26573
Regional air pollution study, emission inventory summarization
[PB-293164/0] N79-26574
Typical costs for electric energy generation and environmental controls
[PB-293502/1] N79-26577
Hydrocarbons in Houston air
[PB-293226/7] N79-26579
Proceedings: Advances in Particles Sampling and Measurement
[PB-293363/8] N79-26581
Association between meteorological conditions and high ozone and sulfate concentrations: A 1974 episode in the Eastern United States
[PB-293485/9] N79-26611
The development of mathematical models for the prediction of anthropogenic visibility impairment, volume 1
[PB-293119/4] N79-26613
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 2: Appendices
[PB-293120/2] N79-26614
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 3: Case studies for selected scenarios
[PB-293121/0] N79-26615
Air purification in the Alpine region
N79-26637
A micrometeorological network for study of transport and diffusion of pollutants in two Apennine Valleys
N79-26638
Theory of noxious gases diffusion at low inversion
N79-26639
Forecast of air pollution in deep valleys
N79-26640
SO2 immission concentration during calm in central alpine basins [aichfeld-mur basin styria]
N79-26641
AIR QUALITY
Air quality data for metals 1975 from the National Air Surveillance network
[PB-293106/1] N79-26570
Washington state air monitoring data for 1977
[PB-293085/7] N79-26573
The development of mathematical models for the prediction of anthropogenic visibility impairment, volume 1
[PB-293119/4] N79-26613
AIR SAMPLING
Level 1 environmental assessment performance evaluation
[PB-292931/3] N79-26564
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment
N79-26722
Pressure and temperature measurements from the U-2 aircraft during the 1977 intertropical convergence experiment
N79-26728
The IMI network in Sweden: Present equipment, methods, and plans for improvement
[AC-40] N79-26740
AIR TRAFFIC
Airport activity statistics of certificated route air carriers
[AD-A067924] N79-26074
Aircraft obstruction of microwave links
[PB-292372/0] N79-26288
AIR TRAFFIC CONTROL
Uplink ATCRBS environment measurements along the Boston-Washington corridor. Volume 2: Interrogator characteristics
[AD-A067944] N79-26041
AIR TRANSPORTATION
Quiet propulsive lift for commuter airlines
[NASA-TM-78596] N79-26035
AIR WATER INTERACTIONS
Ellipsometry as a tool to study the adsorption behavior of synthetic and biopolymers at the air-water interface
N79-26217
AIRBORNE EQUIPMENT
Intertropical convergence zone ozone profiles from the Learjet ozone analyzer
N79-26723
A multiprocessing system for the direct execution of LISP
N79-26809
AIRBORNE/SPACEBORNE COMPUTERS
Onboard image processing
N79-26083
Real-time onboard geometric image correction
N79-26084
Autonomous attitude estimation via star sensing and pattern recognition
N79-26088
Navigation and attitude reference for autonomous satellite launch and orbital operations
N79-26089
On-board orbit determination for application satellites
N79-26093
AIRCRAFT ACCIDENT INVESTIGATION
Aircraft accident report: Las Vegas Airlines, Piper PA-31-350, N44LV, Las Vegas, Nevada, August 30, 1978
[NTSB-AAR-79-8] N79-26034
AIRCRAFT ACCIDENTS
Weather-caused aviation accidents in the Austrian Alps
N79-26634
Study of improved modeling and solution procedures for nonlinear analysis --- aircraft-like structures
[NASA-CR-158750] N79-26875
AIRCRAFT DESIGN
Air cushion landing gear applications study
[NASA-CR-159002] N79-26045
Feasibility study for a numerical aerodynamic simulation facility. Volume 1
[NASA-CR-152287] N79-26068
AIRCRAFT DETECTION
Multiple object tracking with non-unique data-to-object association via generalized hypothesis testing --- tracking several aircraft near each other or ships at sea
N79-26090
AIRCRAFT EQUIPMENT
A simulation investigation of cockpit display of aircraft traffic during curved, descending, decelerating approaches
[NASA-TM-80098] N79-26052
AIRCRAFT MANEUVERS
The calculation of optimal aircraft trajectories
[NPL-DNACS-11/78] N79-26051
AIRCRAFT MODELS
Full-scale aircraft simulation with cryogenic tunnels and status of the National Transonic Facility
[NASA-TM-80085] N79-26064
AIRCRAFT NOISE
Effect of helicopter noise on passenger annoyance
[NASA-TM-80106] N79-26782
AIRCRAFT PERFORMANCE
The calculation of optimal aircraft trajectories
[NPL-DNACS-11/78] N79-26051
AIRCRAFT RELIABILITY
Preliminary airworthiness evaluation AH-1S helicopter equipped with a Garrett infrared radiation suppressor and an AN/ALQ-144 jammer
[AD-A067757] N79-26047

AIRCRAFT SAFETY
An operational research investigation of the ice-detection capability and utility of the surface condition analyzer [SCAN] system and its applicability to Navy-wide use
[AD-A067174] N79-26037
AIRCRAFT SPIN
A study of the drooped leading edge airfoil --- on wind tunnel models to reduce spin entry after stall
[NASA-CR-158717] N79-26013
AIRCRAFT STRUCTURES
Report of the FAA task force on aircraft separation assurance. Volume 1: Executive summary
[AD-A067905] N79-26042
AIRCRAFT WAKES
Ground-based measurements of the wake vortex characteristics of a B-747 aircraft in various configurations
[NASA-TM-80474] N79-26016
AIRFOIL PROFILES
A study of the drooped leading edge airfoil --- on wind tunnel models to reduce spin entry after stall
[NASA-CR-158717] N79-26013
Rotor redesign for a highly loaded 1800 ft/sec tip speed fan. 1: Aerodynamic and mechanical design report
[NASA-CR-159596] N79-26055
AIRFOILS
A viscous/potential flow interaction analysis for circulation-controlled airfoils
[AD-A067913] N79-26030
Computer-aided analysis and design of the shape rolling process for producing turbine engine airfoils
[NASA-CR-135367] N79-26175
Aerodynamic sound generation due to vortex-aerofoil interaction. Part 2: Analysis of the acoustic field
[NASA-CR-152231] N79-26883
AIRLINE OPERATIONS
Aircraft accident report: Las Vegas Airlines, Piper PA-31-350, N44LV, Las Vegas, Nevada, August 30, 1978
[NTSB-AAR-79-8] N79-26034
AIRPORTS
Airport activity statistics of certificated route air carriers
[AD-A067924] N79-26074
ALGEBRA
Contribution to the theory of [N,M]-compact, paracompact and normal spaces
N79-26878
ALGORITHMS
A comparison of filtering algorithms for GPS satellite navigation application
N79-26094
Relativistic information of the GPS-NAVSTAR position determination algorithm
N79-26095
The implementation and evaluation of parallel algorithms on C.mmp
N79-26801
Sensitivity analysis for heuristic algorithms
N79-26805
Algorithms needed in a natural language understanding system
[PB-293232/5] N79-26823
On the stability and convergence of self-tuning algorithms
[OUEL-1259/78] N79-26833
Proximity and reachability in the plane
N79-26838
Computational experiments with systems of nonlinear equations
N79-26841
Splitting the bump in an elimination factorization
[AD-A067712] N79-26849
Kronecker's canonical form and the QZ algorithm
[NPL-DNACS-10/78] N79-26863
Note on the practical significance of the Drazin inverse
[NPL-DNACS-13/79] N79-26864
On linear differential systems having separable exponential form solutions with application to the calculation of transition matrices
N79-26879
Numerical software support for the fusion energy program at Oak Ridge
[CONF-780763-1] N79-26955
ALLOYS
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach
N79-26169
Metastable superconducting alloys
[CALT-822-104] N79-26181
Oxygen overvoltage on nickel and the 50-50 Ni-Fe alloy in 40% KOH at 80 C. Role of oxide films
[P/539/77/13] N79-26189
The mechanical properties data center
[AD-A067974] N79-27016
ALPHA PARTICLES
Effects of suprathermal fusion particles in Tokamak plasmas
N79-26939
Alpha heating in toroidal devices
[COO-2218-123] N79-26957
ALPS MOUNTAINS [EUROPE]
Foehn in Haute Tarentaise: A contribution to the study of a French Alpine Foehn
[MN-MONO-108] N79-26622
Proceedings of the Fifteenth International meeting on Alpine Meteorology, volume I
[SZ-ISSN-0080-7346] N79-26623
Quantitative precipitation measurements by radar in the Ammer Mountains
N79-26624
Mountains and atmospheric boundary layers
N79-26626
Subsidence effects of the Alps
N79-26628
Time-height sections of a frontal system over the Alps
N79-26630
Synoptic analysis of an Alpine weather map
N79-26631
Visual weather conditions for flight over the Alps
N79-26632
The GAFOR system of visual flight forecast for Alpine region
N79-26633
Weather-caused aviation accidents in the Austrian Alps
N79-26634
Air purification in the Alpine region
N79-26637
A micrometeorological network for study of transport and diffusion of pollutants in two Apennine Valleys
N79-26638
SO2 immission concentration during calm in central alpine basins [aichfeld-mur basin styria]
N79-26641
Lee side wind profiles during Foehn
N79-26644
Strong winds and weather conditions in Dinaric Alps
N79-26646
Solar radiation and valley breeze in the southern parts of the Alps
N79-26647
A comparison between the Bernese Jura and Bernese Alps, based on the spring and autumn phenologic phases
N79-26654
The effects of the Alps and the Carpathians on climate of the Pannonian Plain in Yugoslavia
N79-26659
Spring in the Alps: A study of temperature increase
N79-26660
Temperature and cloudiness correlation in the region of Alps
N79-26661
Transport and deposition of Saharan dust over Alps
N79-26670
A case study of frontal developments in the Alps region
N79-26675
Topography of the 0 deg isotherm in the northern Alps in winter time
N79-26680
Air temperature and heat energy balance in Dinaric Alps
N79-26681
Time variations of sunshine and sun radiation in the eastern Alps region?
N79-26682
Radiation balance at 2 high-altitude Alpine stations during the vegetation period
N79-26686
Energy balance of an Alpine pasture, illustrated by an example for a day of the 1976 dryness period
N79-26687
Investigation of water table on the Kesselwandferner [Oetztal Alps] in a 30 m deep firn pit, a synopsis
N79-26690
Probability of the mean sum of monthly precipitation in the Austrian Alps
N79-26691
Spatial and temporal fluctuations of precipitations within an intra-Alpine area as function of general atmospheric circulation [examples taken in Savoy]
N79-26692
Statistical analysis of precipitations in the French Alps
N79-26693
Spatial and temporal variations of the isotopic composition of precipitations at the Alps periphery
N79-26695
Inorganic nitrogen content of precipitation in the lower Alps
N79-26696
Design of distribution maps of precipitation, evaporation, and runoff in the Alps
N79-26708
Numerical simulation of river icing, depending on meteorological parameters, using the Loisach in upper Bavaria as an example
N79-26709
ALTIMETERS
An experimental comparison of the readability of two digital altimeters
[ARL/SYS-NOTE-60] N79-26053
Echo tracker/range finder for radars and sonars
[NASA-CASE-NPO-14361-1] N79-26253
ALUM
Evaluation of aluminum sulfate for phosphorus control in eutrophic lakes
[PB-292989/1] N79-26556
ALUMINUM ALLOYS
The effects of microstructure and strength on the fracture toughness of ultra-high strength aluminum alloys
N79-26159
Stress corrosion cracking of high strength Al-Zn-Mg-Cu alloys: Matrix precipitation
[RAE-TR-78110] N79-26174
Deposition of aluminum-copper alloy on laminated polyimide substrates from an RF induction source
[BDX-613-1993-REV] N79-26186
The role of environment, frequency and wave shape during fatigue crack growth in aluminum alloys
[VTH-LR-270] N79-26187
Microstructural characterization of cast nickel-aluminum bronze
[AUWE-TN-580/78] N79-26196
Evaluation of equivalent initial flaws for damage tolerance annalysis
[AD-A067566] N79-26431
Ultrasonic studies of radiation damage in an aluminum-manganese alloy
N79-26965
Lattice parameters of iron-aluminum silicon alloys with the DO3 structure
[IS-T-831] N79-26992
ALUMINUM COMPOUNDS
Evaluation of aluminum sulfate for phosphorus control in eutrophic lakes
[PB-292989/1] N79-26556
AMINES
Photodegradation and biodegradation of some polymers containing carbonyl groups
N79-26201
AMORPHOUS MATERIALS
Metastable superconducting alloys
[CALT-822-104] N79-26181
Characterization and effects of molecular orientation in amorphous polymers
N79-26204
AMPHIBIOUS AIRCRAFT
Air cushion landing gear applications study
[NASA-CR-159002] N79-26045
ANALOG CIRCUITS
Averaging filter for analog processing of gravitational signals
[LPS-78-10] N79-26280
ANALOG TO DIGITAL CONVERTERS
Device technology for high performance monolithic sample-and-hold circuits
[AD-A067786] N79-26324
ANALYSIS [MATHEMATICS]
A perturbation method for the periodic solutions of a discontinuous system of differential equations
N79-26837
ANALYSIS OF VARIANCE
Redundancy analysis and associated asymptotic distribution theory
N79-26865
ANALYTICAL CHEMISTRY
Chemical composition of exhaust particles from gas turbine engines
[PB-292380/3] N79-26563
ANALYZERS
Intertropical convergence zone ozone profiles from the Learjet ozone analyzer
N79-26723
ANEMOMETERS
Comparative investigation of dynamic properties of some propeller vanes
[KNMI-WR-78-1] N79-26738
ANGULAR CORRELATION
Angular addressing properties of volume Fourier transform holograms in iron-doped lithium niobate
N79-26371
ANGULAR DISTRIBUTION
Angular effects in the sputtering of stainless steel by hydrogen ions
[GA-A-15124] N79-26185
ANGULAR RESOLUTION
High angular resolution observations of the circumstellar OH masers surrounding supergiant stars
N79-27042
ANNUAL VARIATIONS
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578
A comparison between the Bernese Jura and Bernese Alps, based on the spring and autumn phenologic phases
N79-26654
Spring in the Alps: A study of temperature increase
N79-26660
Global solar radiation in a vertical profile of the Carpathians
N79-26685
Snow on the Po watershed of the Northern Apennines
N79-26702

ANNULAR NOZZLES
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 1
[NASA-CR-159575-VOL-1] N79-26884
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 2
[NASA-CR-159575-VOL-2] N79-26885
acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 3
[NASA-CR-159575-VOL-3] N79-26886

ANODES
Oxygen overvoltage on nickel and the 50-50 Ni-Fe alloy in 40% KOH at 80 C. Role of oxide films
[P/539/77/13] N79-26189

ANTENNA ARRAYS
A scannable beam-forming interferometer antenna array system
[NASA-CASE-GSC-12365-1] N79-26252
Microstrip millimeter wave antenna study
[AD-A067948] N79-26264

ANTENNA DESIGN
Design of VHF and UHF communications air/ground antennas
[AD-A067307] N79-26254

ANTENNA RADIATION PATTERNS
Shipboard antenna pattern inversion using Prony's method
[AD-A068018] N79-26262

ANTIFRICTION BEARINGS
Wear properties of dry bearing liners at ambient and elevated temperatures: A preliminary survey
[RAE-TR-78063] N79-26407

ANTISEPTICS
The chemistry of disinfectants in water: Reactions and products
[PB-292776/2] N79-26554

APPLICATIONS PROGRAMS (COMPUTERS)
Transmission Control Protocol (TCP) version 4
[AD-A067072] N79-26257
A research program in computer technology
[AD-A067123] N79-26792
Automatically decomposing signal processing applications on multiprocessors N79-26806

APPROXIMATION
Hypersonic flow past a slender elliptic cone
[AD-A068002] N79-26028
Effects of truncation of a predominantly compression load spectrum on the life of a notched graphite/epoxy laminate
[NASA-TM-80114] N79-26427
Approximate method of elastic-plastic fracture analysis for nozzle corner cracks
[NUREG/CR-0472] N79-26433
Validity of the factorized DWIA in e, e1p reactions
[ISS-P-78/8] N79-26899

ARC DISCHARGES
Vacuum arc switched inverters N79-26304

ARC HEATING
Development of a process for a high capacity arc heater production of silicon for solar arrays
[NASA-CR-158745] N79-26499

ARCHITECTURE (COMPUTERS)
Performance prediction of computer architectures operating on linear mathematical models N79-26789
Direct execution language architecture for simulation
[AD-A067824] N79-26793
A framework for problem-solving in a distributed processing environment N79-26807
Advanced information processing using microarchitecture programmed design N79-27008

ARCTIC REGIONS
Investigation of the phenomenology of the Arctic ionosphere and its relation to the phenomenology of Arctic particle precipitation, part 1
[AD-A067711] N79-26595

ARGON
Raman studies of the orientational motions of small diatomics dissolved in argon. 1: and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite. 2 N79-26122

ARGON LASERS
Investigation of gain and absorption processes in the cadmium-mercury excimer
[AD-A066321] N79-26388

ARIZONA
Design of a 150 kWe distributed collector solar thermal power station
[AED-CONF-78-212-013] N79-26517

ARKANSAS
Distribution of phytoplankton in Arkansas lakes
[PB-292742/4] N79-26768

ARPA COMPUTER NETWORK
A database interface to WAND for the network alerter service --- ARPA computer network
[AD-A066993] N79-27010

ARROW WINGS
Effects of wing leading-edge deflection on low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- wind tunnel tests
[NASA-TP-1434] N79-26020

ARTERIOSCLEROSIS
Effects of dietary fats on atherosclerosis and thrombosis N79-26776

ARTIFICIAL HEART VALVES
Development of an electrical energy converter for driving left heart assist blood pumps
[PB-293510/4] N79-26780

ARTIFICIAL INTELLIGENCE
Intelligent magnetic bubble memories N79-26788
Learning automata: A critique
[S/IS-7703] N79-26843

ARTIFICIAL SATELLITES
On the limits of applicability of the space-charge-limited P-dot driver
[AD-A066131] N79-26104

ASCENT PROPULSION SYSTEMS
Quiet propulsive lift for commuter airlines
[NASA-TM-78596] N79-26035

ASSESSMENTS
Level 1 environmental assessment performance evaluation
[PB-292931/3] N79-26564

ASTRONOMICAL OBSERVATORIES
The Space Telescope Observatory
[NASA-TM-78301] N79-27043

ASTRONOMICAL PHOTOGRAPHY
The UK 1.2m Schmidt telescope and the southern sky survey. Part 2: Photographic techniques
[ROE-OR-4-PT-2] N79-27046

ASTRONOMICAL TELESCOPES
The Space Telescope Observatory
[NASA-TM-78301] N79-27043

ASTROPHYSICS
The applications of the GISS Vidicon system: Selected topics in astrophysics N79-27041
The solution of two dimensional problems in astrophysics N79-27047

ASYMPTOTES
Estimation for uncertain linear systems with jump parameters N79-26874

ASYMPTOTIC METHODS
Redundancy analysis and associated asymptotic distribution theory N79-26865

ASYMPTOTIC SERIES
Expansions in series of Chebyshev polynomials of a function occuring in linear unsteady aerodynamic theory
[RAE-TR-77110] N79-26871

ATLANTIC OCEAN
Analysis of researchable water problems in the south Atlantic gulf region
[PB-293484/2] N79-26458

ATLIT PROJECT
Comparison of theoretical predicted longitudinal aerodynamic characteristics with full-scale wind tunnel data on the ATLIT airplane
[NASA-CR-158753] N79-26018

ATMOSPHERIC ATTENUATION
Feasibility of shipboard laser-attenuation measurements with a portable transmissometer
[AD-A067665] N79-26732

ATMOSPHERIC BOUNDARY LAYER
Mountains and atmospheric boundary layers N79-26626
Results from an attempt to interpolate temperature and wind profiles with respect to time with a one-dimensional boundary layer model
[TR-18] N79-26712

ATMOSPHERIC CHEMISTRY
Model of Advection, Diffusion and Chemistry of Air Pollution (MADCAP), evaluated at San Diego, air basin.
[PB-292526/1] N79-26565
Photodissociation cross sections and spectroscopy of atmospheric positive ions
[AD-A067186] N79-26592
AE reaction rate data
[AD-A067941] N79-26593

ATMOSPHERIC CIRCULATION
A study of conditional instability of the second kind and a numerical simulation of the intertropical convergence zone and easterly waves N79-26583
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 2: Appendices
[PB-293120/2] N79-26614
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 3: Case studies for selected scenarios
[PB-293121/0] N79-26615
Foehn in Haute Tarentaise: A contribution to the study of a French Alpine Foehn
[MN-MONO-108] N79-26622
The changes of the atmospheric circulation indices over the Polish West Carpathians during the last 27 years N79-26627
A contribution to the problem of parametrization of convection clouds in connection with macroscale circulation N79-26668
Simultaneous measurements from three motor-gliders of temperature and humidity horizontal distribution in a cross-section of the Inn Valley east of Innsbruck under condition of mountain and valley winds circulation N79-26677
Spatial and temporal fluctuations of precipitations within an intra-Alpine area as function of general atmospheric circulation (examples taken in Savoy) N79-26692
Notes on the meteorology of the intertropical convergence zone during the July 1977 experiment N79-26718
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment N79-26719
Trace constituent mixing ratios in the lower stratosphere during the 1977 intertropical convergence zone experiment N79-26721
A simple analysis/diagnosis system for real time evaluation of vertical motion
[PB-294216/7] N79-26742

ATMOSPHERIC COMPOSITION
Investigation of infrared spectra of atmospheric gases to support stratospheric spectroscopic investigations
[NASA-CR-158716] N79-26586
Certain characteristics of the atmospheric turbidity N79-26683
Spatial and temporal variations of the isotopic composition of precipitations at the Alps periphery N79-26695
Inorganic nitrogen content of precipitation in the lower Alps N79-26696
Measurement of NO and O3 from aircraft: 1977 tropical convergence zone experiment N79-26720
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment N79-26722
Preliminary results from the University of Denver infrared spectrometer - 1977 intertropical convergence zone experiment N79-26724
The IMI network in Sweden: Present equipment, methods, and plans for improvement
[AC-40] N79-26740

ATMOSPHERIC DENSITY
Some effects of vehicle flow field on the capture efficiency of a Gerdien capacitor atmospheric probe
[AD-A067710] N79-26594

ATMOSPHERIC DIFFUSION
Model of Advection, Diffusion and Chemistry of Air Pollution (MADCAP), evaluated at San Diego, air basin.
[PB-292526/1] N79-26565
Theory of noxious gases diffusion at low inversion N79-26639

ATMOSPHERIC EFFECTS
The role of mold atmospheres in the penetration of molten steel into sand molds N79-26163

ATMOSPHERIC HEAT BUDGET
Air temperature and heat energy balance in Dinaric Alps N79-26681
Quantitative evaluation of the short-wave radiation balance of a glacier N79-26689

ATMOSPHERIC HEATING
The mountain mass of Olympus as a heating source of the lower troposphere N79-26688

ATMOSPHERIC MODELS
Lake-effect storms of Lake Ontario N79-26616
A one-layer model for eddy diffusivity profiles using field data N79-26664
The effect of vertical resolution in a limited area atmospheric model N79-26665
Meteorological studies: Atmospheric analysis, automated weather system development, satellite studies
[AD-A067937] N79-26733
Objective classification of daily 500 mbar patterns
[KNMI-WR-78-8] N79-26737

ATMOSPHERIC MOISTURE
Time-height sections of a frontal system over the Alps
N79-26630
ATMOSPHERIC PHYSICS
An investigation of the interaction, evolution and maintenance of the large-scale waves in the stratosphere and troposphere
N79-26584
The intertropical convergence zone experiment: Background and summary
N79-26716
Operational activities
N79-26717
ATMOSPHERIC RADIATION
Radiation balance at 2 high-altitude Alpine stations during the vegetation period
N79-26686
ATMOSPHERIC SCATTERING
Feasibility of shipboard laser-attenuation measurements with a portable transmissometer
[AD-A067665] N79-26732
ATMOSPHERIC TEMPERATURE
Characterizing thermal conditions in mountainous regions from the standpoint of requirements for cultivated plant growth
N79-26652
South Foehn, north Foehn, and temperature peaks at Innsbruck and Bozen
N79-26678
Peculiar humidity-thermal conditions in a carpathian mountain valley in relation to different weather types
N79-26679
Air temperature and heat energy balance in Dinaric Alps
N79-26681
ATMOSPHERIC TIDES
Day-to-day variations or atmospheric tides as observed by meteor radar
[UILU-ENG-79-2506] N79-26588
ATOMIC EXCITATIONS
An investigation of the atomic fluorine laser excited in a hollow cathode discharge
N79-26383
ATOMIC PHYSICS
Future requirements and present perspectives in data handling for high energy physics experiments
[ISS-T-78/5] N79-26920
ATOMIC STRUCTURE
Atomic and electrical profile studies of ion-implanted semiconductors
N79-26303
ATTENUATION COEFFICIENTS
Considerations about 2.6/9.5 coaxial cable characterization related to high capacity digital systems carrier utilization
[FUB-7-1978] N79-26283
ATTITUDE [INCLINATION]
Spin axis tilt of satellite induced by the internal fluid migration
[NASDA-TR-8] N79-26103
ATTITUDE CONTROL
Performance of low thrust attitude control engines. Part 1: Nozzle flow and performance prediction
[TUM-LRT-TB-77/5-PT-1] N79-26113
Performance of low thrust attitude control engines. Part 2: Hydrazine engines theoretical performance and transport properties of reaction products
[TUM-LRT-TB-77/6-PT-2] N79-26114
Performance of low thrust attitude control engines. Part 3: Power augmented hydrazine performance and thermodynamic properties of reaction products
[TUM-LRT-TB-77/7-PT-3] N79-26115
Performance of low thrust attitude control engines. Part 4: Correlation equation for experimental boundary layer losses
[TUM-LRT-TB-77/14-PT-4] N79-26116
Performance of low thrust attitude control engines. Part 5: Thrust loss determination by test-data-correlation
[TUM-LRT-TB-78/1-PT-5] N79-26117
Performance of low thrust attitude control engines. Part 6: Computation of boundary layer losses
[TUM-LRT-TB-78/2-PT-6] N79-26118
AUDIO FREQUENCIES
Effects of noise frequency on performance and annoyance
[NASA-TM-80107] N79-26781
AUDIOMETRY
Manual audiometry: A comparison of two methods
[NPL-AC-88] N79-26890
AUDITORY PERCEPTION
Manual audiometry: A comparison of two methods
[NPL-AC-88] N79-26890
AUSTENITIC STAINLESS STEELS
An investigation of duplex weld solidification in austenitic stainless steels
N79-26158
Evolution of the properties and structure of 17Cr-13Ni-2Mo very low carbon austenitic stainless steel during high temperature exposure --- fast nuclear reactors
N79-26188
Fe-Cr-Ni stainless steel corrosion in 40% KOH at 150 C and 180 C, part 2
[P/539/77/38] N79-26192
AUSTRIA
Weather-caused aviation accidents in the Austrian Alps
N79-26634
Simultaneous measurements from three motor-gliders of temperature and humidity horizontal distribution in a cross-section of the Inn Valley east of Innsbruck under condition of mountain and valley winds circulation
N79-26677
South Foehn, north Foehn, and temperature peaks at Innsbruck and Bozen
N79-26678
Investigation of water table on the Kesselwandferner [Oetztal Alps] in a 30 m deep firn pit, a synopsis
N79-26690
Probability of the mean sum of monthly precipitation in the Austrian Alps
N79-26691
Climatology of thunderstorms and hail in Austria
N79-26706
AUTOMATA THEORY
Learning automata: A critique
[S/IS-7703] N79-26843
AUTOMATIC CONTROL
An automatic portable telecine camera
[RAE-TM-IT-177] N79-26379
Array automated assembly, phase 2
[NASA-CR-158728] N79-26498
Automatic data structure choice in SETL
N79-26802
The use of simulation languages for studying digital direct control systems
[FUB-5-1978] N79-26821
AUTOMOBILE ENGINES
Performance characteristics of automotive engines in the United States. Third series: Report no. 2, 1978 Pontiac, 301 CID [4.9 liters], 2V
[PB-293772/0] N79-26411
AUTOMOBILE FUELS
Automotive fuel economy and emissions experimental data
[PB-293580/7] N79-26412
Hydrogen storage devices for automobiles
[BNL-25263] N79-26518
AUTOMOBILES
Feasibility study of automative Stirling engine heaters
[R77-719021] N79-26403
AVALANCHE DIODES
Integrated millimeter waves generator
[LCR-489-315] N79-26336
AVIONICS
Trends in reliability modeling technology for fault tolerant systems
[NASA-TM-80089] N79-26810
AXES OF ROTATION
Spin axis tilt of satellite induced by the internal fluid migration
[NASDA-TR-8] N79-26103
AXIAL LOADS
Study of base plates for axially loaded columns
N79-26423
AXISYMMETRIC FLOW
An analytical solution of the thick axisymmetric turbulent boundary layer on a long cylinder of constant radius
N79-26352
An attempted extension of a finite element solution to axisymmetric potential flow --- galerkin method
[WSRL-0056-TR] N79-26359
Numerical solution of a steady, viscous, axisymmetric cavity-flow problem
[NPL-DNACS-12/79] N79-26368
AZIMUTH
Research on an automated inertial azimuth measuring system
[AD-A067938] N79-26043
AZOLES
Development of practical MO techniques for prediction of the properties and behavior of materials --- oxazoles and imidazoles
[AD-A067068] N79-26892

B

BALLISTIC RANGES
Development of a research plan for the improvement of aerodynamic models for analysis of ballistic range data
[AD-A067950] N79-26029
BALLOON SOUNDING
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment
N79-26719
Balloon-borne ECC ozonesonde data, appendix A
N79-26729
BANACH SPACE
Bloch functions in several complex variables
N79-26876
BAND STRUCTURE OF SOLIDS
Catalysis by transition metal compounds --- cobalt oxides
N79-26963
Band and polarization calculations for ferro-electric and piezoelectric crystals
N79-26964
BANDWIDTH
Video telephonic service: Study on the influence of microphone characteristics and band width on intelligibility and quality of audio signals
[FUB-36-1977] N79-26272
BAROCLINITY
The experimentation of a baroclinic model with 5 levels in the south-eastern Europe, including the orography effect
N79-26663
BASALT
Scoping study of salt domes, basalts and crystalline rock as related to long term risk modeling for deep geologic disposal of nuclear waste
[UCRL-13945] N79-26907
BATHOLITHS
Scoping study of salt domes, basalts and crystalline rock as related to long term risk modeling for deep geologic disposal of nuclear waste
[UCRL-13945] N79-26907
BEAM CURRENTS
Physical processes in directed ion beam sputtering
[NASA-CR-159567] N79-26943
BEAM PLASMA AMPLIFIERS
Harmonic generation and parametric excitation in a beam-plasma system
N79-26938
BEAMS [SUPPORTS]
Warping torsion of reinforced concrete beams with thin-walled open sections
N79-26424
BEDS [PROCESS ENGINEERING]
Evaluation of selected chemical processes for production of low-cost silicon, phase 3
[NASA-CR-158739] N79-26977
BELGIUM
The effect of ground relief upon the extreme values of intensity and duration of precipitation in Belgium. Methods and results
N79-26697
BIBLIOGRAPHIES
Parachutes and decelerators, volume 2. A bibliography with abstracts
[NTIS/PS-79/0368/5] N79-26033
Partially annotated tidal marsh bibliography. Second edition: Selected key work index
[PB-293466/9] N79-26760
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 194
[NASA-SP-7011[194]] N79-26770
Index to FAA Office of Aviation Medicine reports: 1961 through 1978
[AD-A067983] N79-26773
The one-on-one stochastic duel, parts 1 and 2 --- bibliographies
[AD-A068008] N79-26869
Cosmic rays, volume 1. A bibliography with abstracts
[NTIS/PS-79/0386/7] N79-27059
Cosmic rays, volume 2. A bibliography with abstracts
[NTIS/PS-79/0387/5] N79-27060
BICRYSTALS
Structure of 001 grain boundaries in bicrystalline thin films of gold
N79-26166
BIHARMONIC EQUATIONS
An iterative solver for a mixed variable variational formulation of the [first] biharmonic problem
[CTH-78.02-R] N79-26860
BINARY STARS
A study of the pulsar in a binary system
N79-27039
BINARY SYSTEMS [MATERIALS]
Liquid-vapor equilibrium measurement and prediction of the binary and ternary systems consisting of methane, ethane, and carbon dioxide at 270.00 K
N79-26130
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach
N79-26169
BIOCHEMISTRY
High pressure science and technology in Japan --- biochemical and geophysical reactions, superhard materials, and other research
[ONRT-M1] N79-26361
BIODEGRADATION
Photodegradation and biodegradation of some polymers containing carbonyl groups
N79-26201
BIODYNAMICS
Prosthesis coupling
[NASA-CASE-KSC-11069-1] N79-26772

BIOENGINEERING
Prosthesis coupling
[NASA-CASE-KSC-11069-1] N79-26772
BIOLOGICAL EFFECTS
Biological effects of high altitude climate and its therapeutic applications
N79-26650
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 194
[NASA-SP-7011(194)] N79-26770
BIOMEDICAL DATA
Biomedical ultrasonoscope
[NASA-CASE-ARC-10994-2] N79-26771
Index to FAA Office of Aviation Medicine reports: 1961 through 1978
[AD-A067983] N79-26773
BIOMETRICS
A long-range and long-life telemetry data-acquisition system for heart rate and multiple body temperatures from free-ranging animals
[NASA-TM-78590] N79-26762
Biomedical ultrasonoscope
[NASA-CASE-ARC-10994-2] N79-26771
BIOTECHNOLOGY
Analytical methods for biotechnological design of man machine systems: Work on system ergonomy
[FB-28] N79-26787
BIOTELEMETRY
A long-range and long-life telemetry data-acquisition system for heart rate and multiple body temperatures from free-ranging animals
[NASA-TM-78590] N79-26762
BIPOLAR TRANSISTORS
Transient radiation and dose-enhancement effects in transistors
[AD-A067629] N79-26313
BIRD-AIRCRAFT COLLISIONS
An evaluation of the bird/aircraft strike hazard Dyess Air Force Base, Texas
[AD-A068026] N79-26039
BLACK HILLS (SD-WY)
Regional geologic analysis of the Black Hills of South Dakota and Wyoming from remote sensing data
N79-26437
BLADE TIPS
A method of computing the pressure distribution on a single-bladed hovering helicopter rotor
N79-26044
BLADES (CUTTERS)
Analysis and evaluation of processes and equipment in tasks 2 and 4 of the low-cost solar array project
[NASA-CR-158744] N79-26485
Silicon ingot casting, heat exchanger method multi-wire slicing, fixed abrasive slicing technique. Phase 3: Silicon sheet growth development for the large area sheet task of the low-cost solar array project
[NASA-CR-158734] N79-26981
BLANKETS (FUSION REACTORS)
Doublet demonstration fusion power reactor study
[GA-A-14742] N79-26946
BLOCKING
Aircraft obstruction of microwave links
[PB-292372/0] N79-26288
BLOOD
Preparation of some prostaglandin E sub 1 omega-homo-prostaglandin E sub 1 esters and their inhibiting properties on rat blood platelet aggregation
N79-26765
BLOOD PUMPS
Development of an electrical energy converter for driving left heart assist blood pumps
[PB-293510/4] N79-26780
BODIES OF REVOLUTION
Optimum tail fairings for bodies of revolution --- computerized design
[AD-A067927] N79-26031
Three-dimensional boundary layers on bodies of revolution at incidence
N79-26350
BOEING 747 AIRCRAFT
Ground-based measurements of the wake vortex characteristics of a B-747 aircraft in various configurations
[NASA-TM-80474] N79-26016
Boeing 747 aircraft with large external pod for transporting outsize cargo
[NASA-CR-159067] N79-26063
BOILERS
Steam generator component studies with RELAP4/MOD6
[CVAP-TR-78-019] N79-26526
BOLTS
Investigations into the mechanical behavior of composite bolted joints
[NASA-CR-158752] N79-26402
BORIDES
Hydrogen electrode and nickel boride alloys
[P/539/77/30] N79-26533
BOROSILICATE GLASS
Alternative waste management options, Nuclear Fuel Services, Inc., high level waste --- converting to borosilicate glass
[ANL-K-78-4190-2] N79-26908
BOUNDARY LAYER CONTROL
A viscous/potential flow interaction analysis for circulation-controlled airfoils
[AD-A067913] N79-26030
BOUNDARY LAYER EQUATIONS
Performance of low thrust attitude control engines. Part 4: Correlation equation for experimental boundary layer losses
[TUM-LRT-TB-77/14-PT-4] N79-26116
BOUNDARY LAYER FLOW
Optimum tail fairings for bodies of revolution --- computerized design
[AD-A067927] N79-26031
BOUNDARY LAYER SEPARATION
Control of forebody three-dimensional flow separations
[NASA-TM-78593] N79-26014
BOUNDARY LAYER STABILITY
Performance of low thrust attitude control engines. Part 6: Computation of boundary layer losses
[TUM-LRT-TB-78/2-PT-6] N79-26118
BOUNDARY LAYER TRANSITION
Summary of past experience in natural laminar flow and experimental program for resilient leading edge
[NASA-CR-152276] N79-26024
BOUNDARY LAYERS
Full-scale aircraft simulation with cryogenic tunnels and status of the National Transonic Facility
[NASA-TM-80085] N79-26064
BOUNDARY VALUE PROBLEMS
Boundary integral equation methods applied to wave problems
[AD-A067536] N79-26261
Development of partial channel flow for arbitrary input velocity distributions using boundary-fitted coorinate systems
[AD-A067623] N79-26365
An approach to biased estimation in regression analysis
N79-26839
On the boundary value problem u second derivative + u = 1/alpha u + p(t) u[0] = 0 = n [pi0
N79-26857
BOW WAVES
The dc magnetic field observations at the earth's bow shock
[LPS-78-5] N79-27050
BRAYTON CYCLE
Brayton-cycle component characteristics
N79-26479
Candidate power-conversion system cycles, appendix A
N79-26484
BRILLOUIN EFFECT
Stimulated Brillouin sidescatter and backscatter of carbon dioxide laser radiation from a laser altered arc plasma
N79-26937
BRONZES
Microstructural characterization of cast nickel aluminum bronze
[AUWE-TN-580/78] N79-26196
BUBBLE MEMORY DEVICES
Intelligent magnetic bubble memories
N79-26788
BUILDINGS
Wind excited motion of buildings
N79-26239
BURNING RATE
Thermogravimetric analysis of solid refuse-derived fuels and coal
[AD-A067829] N79-26225
Erosive burning of composite solid propellants: Experimental and modeling studies
[AD-A067649] N79-26227
BUS CONDUCTORS
Electrical characterization of standard and radiation-hardened RCA CDP1856D 4-BIT, CMOS, bus buffer/separator
[NASA-CR-158725] N79-26314
BY-PRODUCTS
The chemistry of disinfectants in water: Reactions and products
[PB-292776/2] N79-26554
Enthalpy measurements for coal-derived liquids
N79-26997

C

C-130 AIRCRAFT
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978 --- Colby, Kansas and Yuma, Colorado
[E79-10215] N79-26442
C-141 AIRCRAFT
Airborne infrared and submillimeter astronomical polarization measurements at different wavelengths --- C-141 observations
[NASA-CR-158751] N79-27044
CADMIUM
No more cadmium plating? Are there processes to replace it?
[DRIC-TRANS-5462] N79-26195
Investigation of gain and absorption processes in the cadmium-mercury excimer
[AD-A066321] N79-26388
CADMIUM TELLURIDES
Growth and homogeneity characterization of mercury cadmium telluride crystals
[AD-A067670] N79-26990
CALCIUM COMPOUNDS
A preliminary study on the dosimetric properties of CaSO4: Dyribbon [TLD-900]
[ISS-P-78/14] N79-26902
CALCIUM ISOTOPES
Thin-source concentration dependent diffusion --- using isotopic labeling for measuring the diffusion of calcium cations in sodium chloride
N79-26966
CALCULUS OF VARIATIONS
An iterative solver for a mixed variable variational formulation of the [first] biharmonic problem
[CTH-78.02-R] N79-26860
Realistic interactions and variational calculations of the ground state properties of three body systems on a harmonic oscillator basis
[ISS-P-78/10] N79-26900
Information on nucleon-nucleon interaction from nuclear matter calculations
[ISS-P-78/12] N79-26921
CALIFORNIA
Digital simulation of snowmelt runoff
[PB-293252/3] N79-26457
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
CANADA
CCRS airborne program assessment. Volume 1: Analysis
[PB-293161/6] N79-26469
CCRS airborne program assessment. Volume 2: User reports
[PB-293162/4] N79-26470
CANARD CONFIGURATIONS
Aerodynamic characteristics of the close-coupled canard as applied to low-to-moderate swept wings. Volume 2: Subsonic speed regime
[AD-A067122] N79-26025
CANONICAL FORMS
Kronecker's canonical form and the QZ algorithm
[NPL-DNACS-10/78] N79-26863
CAPACITORS
Some effects of vehicle flow field on the capture efficiency of a Gerdien capacitor atmospheric probe
[AD-A067710] N79-26594
CARBON DIOXIDE
A pore model for gasification reactions: An application to the system C-CO2-CO-N2
N79-26127
Liquid-vapor equilibrium measurement and prediction of the binary and ternary systems consisting of methane, ethane, and carbon dioxide at 270.00 K
N79-26130
CARBON DIOXIDE LASERS
Welding of copper silicon and zirconium II using the 200 watt CO2 continuous laser
[UNI-1190] N79-26395
Plated copper substrates for the LASL Antares CO2 laser system --- mirror design
[LA-UR-79-9] N79-26397
Stimulated Brillouin sidescatter and backscatter of carbon dioxide laser radiation from a laser altered arc plasma
N79-26937
CARBON DIOXIDE REMOVAL
Technology advancement of the electrochemical CO2 concentrating process
[NASA-CR-152250] N79-26135
CARBON MONOXIDE
Non-urban hydrocarbon concentrations in ambient air north of Houston, Texas
[PB-293227/5] N79-26580
CARBONYL COMPOUNDS
Photodegradation and biodegradation of some polymers containing carbonyl groups
N79-26201
CARBORANE
Tetracarbon metallocarboranes. 7: Cobalt systems derived from [CH3]4C4B8H8. Synthesis and interconversion of 11-, 12-, and 13- vertex nido cages
[AD-A067671] N79-26141
Tetracarbon metallocarboranes. 6: Stereochemical relationships between Co2C4B6 cage isomers formed by oxidative fusion. Crystal structure of [n5-C5h5]2Co2[CH3]4C4B6H6 isomer 5
[AD-A067836] N79-26989
CARDIAC VENTRICLES
Influences of dietary fats on coronary flow rate and left ventricular work of the isolated rat heart
N79-26766
Effects of dietary fats on the coronary flow rate and the left ventricular function of the isolated rat heart
N79-26767

CARRIER WAVES
Considerations about 2.6/9.5 coaxial cable characterization related to high capacity digital systems carrier utilization
[FUB-7-1978] N79-26283
CARTESIAN COORDINATES
Proximity and reachability in the plane
N79-26838
CAST ALLOYS
Microstructural characterization of cast nickel aluminum bronze
[AUWE-TN-580/78] N79-26196
CASTING
The role of mold atmospheres in the penetration of molten steel into sand molds
N79-26163
CATALYSIS
Low cost solar array project: Composition measurements by analytical photon catalysis
[NASA-CR-158737] N79-26500
Catalysis by transition metal compounds --- cobalt oxides
N79-26963
Interband transitions of semiconducting oxides determined from photoelectrolysis spectra
[AD-A066188] N79-26982
CATALYSTS
Steady state and stability characteristics of catalytic arrays
N79-26129
Reduction of silica supported nickel catalysts
N79-26194
Catalytic properties of natural and rare-earth-promoted manganese nodules
[PB-293267/1] N79-26200
Turbulent and fast fluidization [high velocity fluidization]
N79-26348
CATIONS
Thin-source concentration dependent diffusion --- using isotopic labeling for measuring the diffusion of calcium cations in sodium chloride
N79-26966
CAVITIES
Numerical solution of a steady, viscous, axisymmetric cavity-flow problem
[NPL-DNACS-12/79] N79-26368
CENTRAL PROCESSING UNITS
A framework for problem-solving in a distributed processing environment
N79-26807
CERAMICS
Ceramic gas turbine engine demonstration program
[AD-A067970] N79-26059
The resistance of ceramics to chemical attack
[NPL-CHEM-96] N79-26219
Thermodynamics and mechanisms of sintering
[LBL-8419] N79-26998
CHALCOGENIDES
Surface studies of group IV-VI layered crystals
N79-26967
Superlattice formation in group 4-B transition metal dichalcogenides
N79-26971
CHANNEL FLOW
Development of partial channel flow for arbitrary input velocity distributions using boundary-fitted coorinate systems
[AD-A067623] N79-26365
CHANNELS [DATA TRANSMISSION]
Coding for the control of intersymbol interference in baseband channels
N79-26248
Adaptive delta modulation: Digital filtering and the effects of random channel errors
N79-26310
CHARACTERIZATION
Microstructural characterization of cast nickel aluminum bronze
[AUWE-TN-580/78] N79-26196
Considerations about 2.6/9.5 coaxial cable characterization related to high capacity digital systems carrier utilization
[FUB-7-1978] N79-26283
Characterization of optical fibers and design criteria of communication systems
[FUB-14-1978] N79-26935
CHARGE COUPLED DEVICES
Effects of surface states on the low frequency transfer inefficiency in CCD's
N79-26302
CHARGE TRANSFER
Synthesis of polyesters containing tetrathiafulvalene groups in the backbone
[AD-A066972] N79-26210
CHEBYSHEV APPROXIMATION
Expansions in series of Chebyshev polynomials of a function occuring in linear unsteady aerodynamic theory
[RAE-TR-77110] N79-26871
CHEMICAL ANALYSIS
Scattering studies from polymer blends
N79-26202
Level 1 environmental assessment performance evaluation
[PB-292931/3] N79-26564
CHEMICAL ATTACK
Thermoplastic materials: Water electrolysis
[P/539/77/06] N79-26152
The resistance of ceramics to chemical attack
[NPL-CHEM-96] N79-26219
CHEMICAL BONDS
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
[LBL-8294] N79-26142
Analytic models for the treatment of alternant linear heteropolymers
N79-26203
CHEMICAL COMPOSITION
Relative chemical composition of selected synthetic crudes
[CONF-781150-4] N79-26231
Low cost solar array project: Composition measurements by analytical photon catalysis
[NASA-CR-158737] N79-26500
CHEMICAL EQUILIBRIUM
Electrochemical and spectral investigations of Ni[II] ion equilibria in room temperature chloroaluminate solvents
[AD-A067782] N79-26138
CHEMICAL LASERS
Computational study of chemical reaction dynamics at the gas-solid interface
[AD-A067854] N79-26392
CHEMICAL REACTIONS
Effect of vibratic ial excitation in reactions of OH with H2
[AD-A058571] N79-26134
ARIS manual
[AD-A067830] N79-26139
Flame retardation of polymers
N79-26205
Synthesis of polyesters containing tetrathiafulvalene groups in the backbone
[AD-A066972] N79-26210
High pressure science and technology in Japan --- biochemical and geophysical reactions, superhard materials, and other research
[ONRT-M1] N79-26361
The chemistry of disinfectants in water: Reactions and products
[PB-292776/2] N79-26554
Computer-aided investigation of reaction path synthesis
N79-26891
CHIMNEYS
Theoretical study of the dynamic response of a chimney to earthquake and wind
[PB-293561/7] N79-26244
CHIPS [ELECTRONICS]
Design and analysis of integrated electrothermal filters
N79-26295
CHLOROBENZENES
Third report of the TSCA Interagency Testing Committee to the administrator, Environmental Protection Agency
[PB-293378/6] N79-26465
CHROMATOGRAPHY
Chemical composition of exhaust particles from gas turbine engines
[PB-292380/3] N79-26563
CINEMATOGRAPHY
An automatic portable telecine camera
[RAE-TM-IT-177] N79-26379
CIRCUIT PROTECTION
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
CIRCULAR CYLINDERS
An analytical solution of the thick axisymmetric turbulent boundary layer on a long cylinder of constant radius
N79-26352
CIRCULAR PLATES
Study of base plates for axially loaded columns
N79-26423
CIRCULAR POLARIZATION
Quasi-optical elbows in circular waveguide connections
[FUB-39-1977] N79-26273
CITIES
Interactive multiple objective optimization
[PB-293211/9] N79-26468
Radiofrequency radiation levels and population exposure in urban areas of the eastern United States
[PB-292855/4] N79-26779
CIVIL AVIATION
Airport activity statistics of certificated route air carriers
[AD-A067924] N79-26074
CLASSIFICATIONS
International science indicators: Development of indicators of international scientific activity using the science citation index
[PB-293033/7] N79-27020
CLAYS
Geotechnical aspects of subsurface seabed disposal of high level radioactive wastes --- core sampling
[COO-4069-1] N79-26918
CLEAN ENERGY
LLL wind energy studies [OAHU]
[UCRL-82171] N79-26514
CLEAR AIR TURBULENCE
CAT information display system users manual
[NASA-CR-161243] N79-26711
CLIMATE
The effects of the Alps and the Carpathians on climate of the Pannonian Plain in Yugoslavia
N79-26659
CLIMATOLOGY
Characterizing dispersion on a climatological basis
[PNL-SA-6832] N79-26543
The relationship of the thermal regime of the soil to the extrinsic environment, with special reference to the north central United States
N79-26582
The changes of the atmospheric circulation indices over the Polish West Carpathians during the last 27 years
N79-26627
Biological effects of high altitude climate and its therapeutic applications
N79-26650
Quantitative evaluation of the complex thermal effects on climatic therapy
N79-26651
Paleoclimate of the Nendaz region. New interpretation of the post-wurmian warming
N79-26657
The mountain mass of Olympus as a heating source of the lower troposphere
N79-26688
Quantitative evaluation of the short-wave radiation balance of a glacier
N79-26689
Climatology of thunderstorms and hail in Austria
N79-26706
CLINICAL MEDICINE
Fluorescence measurements on a minidisc centrifugal analyzer with a pulsed nitrogen laser source
N79-26125
CLOSED CYCLES
Stirling engine characteristics
N79-26480
Examination of specific aspects of cooling tower testing methodology
[EPRI-FP-953] N79-26545
CLOUD COVER
Temperature and cloudiness correlation in the region of Alps
N79-26661
Cloudiness situation in the Alpine region under various weather conditions
N79-26662
CLOUD SEEDING
Chaff seeding in a dynamical-electrical cloud model
N79-26617
Project STORMFURY: Experiments and outlook
[PB-294210/0] N79-26750
CLOUDS [METEOROLOGY]
Meteorological studies: Atmospheric analysis, automated weather system development, satellite studies
[AD-A067937] N79-26733
CLUMPS
Investigations of distant field stars and clusters in the galactic anticenter
N79-27040
CMOS
Radiation hardened CMOS/SOS code generator for space applications
[AD-A067980] N79-26327
COAL
The decomposition of polycyclic organic matter adsorbed on coal fly ash
N79-26119
Formation and transformation of polycyclic organic matter from coal combustion
[COO-4347-1] N79-26145
Characterization of multialkylated polycyclic aromatic hydrocarbons in energy-related materials
[CONF-781039-9] N79-26147
Fuel contaminants, volume 4: Application of oil agglomeration to coal wastes
[PB-293210/1] N79-26236
Characterization of fly ash from coal combustion
[COO-4347-4] N79-26547
COAL GASIFICATION
Process design for coal conversion reactors
[CONF-781110-15] N79-26232
A Kentucky energy resource utilization program
[PB-292949/5] N79-26538
COAL LIQUEFACTION
Coal liquefaction test center
[FE-1517-67] N79-26226
Process design for coal conversion reactors
[CONF-781110-15] N79-26232
Fuel contaminants. Volume 3: Control of coal-related pollutants
[PB-293328/1] N79-26234

A Kentucky energy resource utilization program
[PB-292949/5] N79-26538
Enthalpy measurements for coal-derived liquids
N79-26997

COAL UTILIZATION
Pulverised fuel non-return flap valve
[TDB-317] N79-26408
System study on the feasibility of a coal-fired total-energy plant [with solar options] for Sandia Laboratories
[SAND-78-0979] N79-26530

COASTAL WATER
Satellite oceanography of eastern boundary currents and its implications to ASW
[AD-A067259] N79-26754

COASTS
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
Proceedings of a Workshop on Coastal Sediment Transport Study
[PB-293632/6] N79-26757

COAXIAL CABLES
The physics of braided-shield coaxial cable
N79-26251
Considerations about 2.6/9.5 coaxial cable characterization related to high capacity digital systems carrier utilization
[FUB-7-1978] N79-26283
Comments on repeater distance dimensioning in coaxial cable digital data transmission
[FUB-26-1977] N79-26337

COBALT
High-cycle fatigue behavior of a cobalt-based eutectic alloy
N79-26161

COBALT ALLOYS
High temperature deformation of solid solution strengthened superalloys --- nickel-base Hastelloy alloy C-276 and cobalt-base Haynes alloy No. 188
N79-26165

COBALT COMPOUNDS
Tetracarbon metallocarboranes. 7: Cobalt systems derived from [CH3]4C4B8H8. Synthesis and interconversion of 11-, 12-, and 13- vertex nido cages
[AD-A067671] N79-26141
Tetracarbon metallocarboranes. 6: Stereochemical relationships between Co2C4B6 cage isomers formed by oxidative fusion. Crystal structure of [n5-C5h5]2Co2[CH3]4C4B6H6 isomer 5
[AD-A067836] N79-26989

COBALT OXIDES
Catalysis by transition metal compounds --- cobalt oxides
N79-26963

COCKPIT SIMULATORS
A simulation investigation of cockpit display of aircraft traffic during curved, descending, decelerating approaches
[NASA-TM-80098] N79-26052

CODING
Error rate estimation method based on the detection of line coding violations
[FUB-11-1978] N79-26286

COHERENT RADIATION
Advanced multidither coat studies
[AD-A068005] N79-26932
Statistics of speckle propagation
[AD-A067885] N79-26933

COLD PLASMAS
A fluid description of plasma double-layers
[NASA-CR-158719] N79-26942

COLD WEATHER TESTS
Study of water drainage from columns of snow
[AD-A066935] N79-26590

COLLIMATION
Optical quality of tilted spherical mirror unstable resonators
[AD-A068015] N79-26394

COLLISION AVOIDANCE
Report of the FAA task force on aircraft separation assurance. Volume 1: Executive summary
[AD-A067905] N79-26042

COLLISION PARAMETERS
Hadron-nucleus inclusive data from Fermilab
[COO-3065-210] N79-26912
Physical processes in directed ion beam sputtering
[NASA-CR-159567] N79-26943

COLOR TELEVISION
Radiation safety in the use of color television sets
[ISS-T-77/4] N79-26276

COLORADO
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978 --- Colby, Kansas and Yuma, Colorado
[E79-10215] N79-26442
Institutional arrangements for effective water management in Colorado
[PB-293647/4] N79-26466

COLUMBIA RIVER BASIN [ID-OR-WA]
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL] --- Oregon
[E79-10220] N79-26447

COLUMNS [SUPPORTS]
Study of base plates for axially loaded columns
N79-26423

COMBINATIONS [MATHEMATICS]
On fractional replication of symmetrical factorial designs where the number of levels is not necessarily a prime or power of a prime
N79-26866

COMBINATORIAL ANALYSIS
The prime discriminant factorization of discriminants of algebraic number fields
N79-26836

COMBUSTION
Development of combustion data to utilize low-Btu gases as industrial process fuels
[FE-2489-30] N79-26143
Combustion optimization studies for stratified charge and diesel engines
[COO-4191-1] N79-26149
Thermogravimetric analysis of solid refuse-derived fuels and coal
[AD-A067829] N79-26225

COMBUSTION CHAMBERS
General purpose rocket furnace
[NASA-CASE-MFS-23460-1] N79-26075
Studies on flame propagation in powdered mixtures
N79-26128
Experimental clean combustor program: Diesel no. 2 fuel addendum, phase 3
[NASA-CR-135413] N79-26221
Fuel hydrogen content as an indicator of radiative heat transfer in an aircraft gas turbine combustor
[AD-A067709] N79-26224
An evaluation of nozzle response to transient disturbances
N79-26355

COMBUSTION PRODUCTS
Formation and transformation of polycyclic organic matter from coal combustion
[COO-4347-1] N79-26145
Sandia laboratory combustion simulation facility --- for analyzing the flow of high temperature combustion products
[SAND-78-2240] N79-26146
Characterization of fly ash from coal combustion
[COO-4347-4] N79-26547
Proceedings: Third Workshop on catalytic combustion
[PB-293336/4] N79-26548

COMBUSTION STABILITY
Combustion noise prediction: Entropy/vorticity effects --- in gas turbines
[AD-A067993] N79-26882

COMET 4 AIRCRAFT
A study of smoke movement in an aircraft fuselage
[RAE-TM-EP-613] N79-26040

COMETS
Rendezvous missions to comets with electrically spacecraft
[TUM-LRT-TB-78/6-1] N79-26081
An encounter with Halley's comet at 24 km per second
[TUM-LRT-TB-78/5] N79-27052

COMMAND MODULES
ATROPOS: A versatile data acquisition and analysis system
[SLAC-PUB-2220] N79-27019

COMMERCE
Management of federal R and D for commercialization: Executive summary
[PB-292851/3] N79-27036
Management of federal R and D for commercialization
[PB-292852/1] N79-27037
Management of federal R and D for commercialization: Appendices: Supporting documentation
[PB-292853/9] N79-27038

COMMERCIAL AIRCRAFT
Airport activity statistics of certificated route air carriers
[AD-A067924] N79-26074

COMMERCIAL ENERGY
Commercial synchronous alternating-current generators
N79-26482

COMMUNICATION NETWORKS
Transmission Control Protocol [TCP] version 4
[AD-A067072] N79-26257
A research program in computer technology
[AD-A067123] N79-26792
Switching in optical channel waveguides
N79-26930

COMMUNICATION SATELLITES
Millimeter wave satellite concepts. Volume 1: Executive summary
[NASA-CR-159504] N79-26101
Millimeter wave satellite concepts. Volume 2: Technical report
[NASA-CR-159503] N79-26102
EMS [Electronic Message Service]: System definition and evaluation
[PB-292934/7] N79-26292

COMMUTATION
Control procedures in block commutation networks, part 1
[FUB-8-1978] N79-26284

COMPANION STARS
A study of the pulsar in a binary system
N79-27039

COMPARISON
Comparison between two calculation procedures for internal combustion engine exhaust systems
N79-26406

COMPILERS
CONVERS: An interpretive compiler
[AD-A067746] N79-26794

COMPLEX VARIABLES
Bloch functions in several complex variables
N79-26876

COMPOSITE MATERIALS
Degradation mechanism of Nb3Sn composite wires under tensile strain at 4.2 K
[BNL-24957] N79-26184

COMPOSITE PROPELLANTS
Erosive burning of composite solid propellants: Experimental and modeling studies
[AD-A067649] N79-26227

COMPOSITE STRUCTURES
Evaluation of flawed composite structural components under static and cyclic loading --- fatigue life of graphite-epoxy composite materials
[NASA-CR-135403] N79-26120
Prototype development of an optimized, tapered-thickness, graphite/epoxy composite flywheel
[UCRL-52623] N79-26121

COMPRESSED GAS
Stability evaluation of ambient concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide contained in compressed gas cylinders
[PB-292749/9] N79-26153

COMPRESSIBILITY
Effect of water content on the compressibility of snow-water mixtures
[AD-A066936] N79-26589

COMPRESSION TESTS
Effects of truncation of a predominantly compression load spectrum on the life of a notched graphite/epoxy laminate
[NASA-TM-80114] N79-26427

COMPRESSOR BLADES
The influence of compressor inlet guide vane/stator relative circumferential positioning on blade wake transport and interaction
[AD-A067969] N79-26060
Online monitoring of compressor blade stress: An improved system
[AD-A067403] N79-26061

COMPRESSOR ROTORS
Rotor redesign for a highly loaded 1800 ft/sec tip speed fan. 1: Aerodynamic and mechanical design report
[NASA-CR-159596] N79-26055

COMPUTATIONAL FLUID DYNAMICS
An attempted extension of a finite element solution to axisymmetric potential flow --- galerkin method
[WSRL-0056-TR] N79-26359

COMPUTER GRAPHICS
Host-computer implementation guidelines for the three-dimensional Graphics Compatibility System [GCS]
[AD-A067976] N79-26815
Navy laboratory interactive graphics study
[AD-A067402] N79-26816
Inventory of data bases, graphics packages, and models in Department of Energy laboratories
[ORNL-EIS-144] N79-27018

COMPUTER NETWORKS
Transmission Control Protocol [TCP] version 4
[AD-A067072] N79-26257
Product differentiation in computer services
N79-26824
Switching in optical channel waveguides
N79-26930
Q, a communications query language for SEED
[AD-A066994] N79-27011

COMPUTER PROGRAMMING
Computation of the equilibrium points in an electric network with many machines
[FUB-2-1978] N79-26340
Dynamic analysis and design sensitivity analysis of mechanisms with intermittent motion
N79-26399
A research program in computer technology
[AD-A067123] N79-26792
Software systems research
[COO-2383-51] N79-26817
The design and implementation of software for unconstrained optimization
[NPL-DNACS-8/78] N79-26820
The use of simulation languages for studying digital direct control systems
[FUB-5-1978] N79-26821
A primer for MLAB: An on-line modelling laboratory
[PB-292895/0] N79-26822
Functions of a particular class of singular matrices
[FUB-12-1977] N79-26858
SCATS: SRB Cost Accounting and Tracking System handbook
[NASA-TM-78302] N79-27002
The multiple path problem in data base schemata
[AD-A067147] N79-27015

Integrated systems: A modern trend in the development of automated design systems
N79-27065

COMPUTER PROGRAMS

Computer programs for calculating two-dimensional potential flow through deflected nozzles
[NASA-TM-79144] N79-26019

Feasibility study for a numerical aerodynamic simulation facility. Volume 3: FMP language specification/user manual
[NASA-CR-152289] N79-26070

ARIS manual
[AD-A067830] N79-26139

MINIMUF-3.5 improved version of MINIMUF-3, a simplified HF MUF prediction algorithm
[AD-A066256] N79-26256

Radar system analysis algorithms: Radar system analysis models of performance degradation by mutual interference
[AD-A068019] N79-26263

Corona performance of toroidal electrodes for high voltage equipment
N79-26309

Computer program for calculation of separated turbulent flows on axisymmetric afterbodies including exhaust plume effects
[AD-A066925] N79-26363

Turbulent flow past a self-propelled vehicle. 2: Computation
[AD-A067795] N79-26364

Design charts for torsional properties of non-circular shafts --- stress analysis
[AD-A064109] N79-26401

APES-finite element fracture mechanics analysis revised documentation
[AD-A066246] N79-26430

Distributed routing rainfall-runoff model
[PB-292303/5] N79-26451

SAMICS validation. SAMICS support study, phase 3
[NASA-CR-158746] N79-26491

Steam generator component studies with RELAP4/MOD6
[CVAP-TR-78-019] N79-26526

FEDBAK03: A computer program for the modeling of first order consecutive reactions with feedback under a steady state multidimensional natural aquatic system. Program documentation and user's guide
[PB-292760/6] N79-26553

Use of a single function subroutine for multi-region ionospheric profiles with a versatile three-dimensional ray tracing program
[UIO-SR-78-03] N79-26599

CAT information display system users manual
[NASA-CR-161243] N79-26711

CONVERS: An interpretive compiler
[AD-A067746] N79-26794

Factors affecting the usefulness of flow charts and other formats for computer programs
N79-26803

An automated software maintence tool for large-scale operating systems
[AD-A067799] N79-26813

Development of mathematical software and mathematical software libraries
[AD-A068023] N79-26814

Host-computer implementation guidelines for the three-dimensional Graphics Compatibility System [GCS]
[AD-A067976] N79-26815

Adaptive allocation of decision making responsibility between human and computer in multitask situations
N79-26827

Design method for the layout of quasi optical elbows in a connection with circular wave guides
[FUB-6-1978] N79-26934

Stability calculations for MHD magnets
[CONF-781055-4] N79-26960

Semiconductor measurement technology: DISTRIB 1, an impurity redistribution computer program
[PB-293293/7] N79-26994

FINCAP analysis: A method for financial capability analysis of Air Force contractors
[AD-A067998] N79-27006

Control programs and data structures for a multiple alerter implementation in a relational data base
[AD-A067168] N79-27013

Structuring of data systems: Psychophysiological data from the dynamic flight simulator
[AD-A067175] N79-27014

A information retrieval system for research file data --- utilizing a computer program
[AD-A068021] N79-27017

Principles of the construction of a new generation of SAPR's
N79-27066

COMPUTER STORAGE DEVICES

Computer sciences and technology: Computer peripheral memory system forecast
[PB-294148/2] N79-26799

COMPUTER SYSTEMS DESIGN

Feasibility study for a numerical aerodynamic simulation facility. Volume 1
[NASA-CR-152287] N79-26068

Feasibility study for a numerical aerodynamic simulation facility. Volume 2: Hardware specifications/descriptions
[NASA-CR-152288] N79-26069

Simulation of an information system with a distributed architecture
[FUB-34-1977] N79-26819

Planning and control of software based systems
[RSRE-78012] N79-26825

Advanced information processing using microarchitecture programmed design
N79-27008

COMPUTER SYSTEMS PROGRAMS

Inertial Upper Stage [IUS] software analysis
[NASA-CR-161251] N79-26107

A hierarchical model of portable input/output
N79-26808

Software systems research
[COO-2383-51] N79-26817

Planning and control of software based systems
[RSRE-78012] N79-26825

Computer-aided investigation of reaction path synthesis
N79-26891

COMPUTER TECHNIQUES

Orbit/attitude estimation with LANDSAT Landmark data
N79-26086

Accurate chemical characterization by fluorescence spectrometry
N79-26126

Output capacity of the stored program control [SPC] commutation system
[FUB-35-1977] N79-26271

COMPUTERIZED DESIGN

Optimum tail fairings for bodies of revolution --- computerized design
[AD-A067927] N79-26031

Computer-aided analysis and design of the shape rolling process for producing turbine engine airfoils
[NASA-CR-135367] N79-26175

Computer-aided design of microwave integrated parametric amplifiers
N79-26306

Translations on USSR science and technology: Physical sciences and technology, no. 72
[JPRS-73663] N79-27064

Integrated systems: A modern trend in the development of automated design systems
N79-27065

Principles of the construction of a new generation of SAPR's
N79-27066

COMPUTERIZED SIMULATION

Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067

Feasibility study for a numerical aerodynamic simulation facility. Volume 1
[NASA-CR-152287] N79-26068

Feasibility study for a numerical aerodynamic simulation facility. Volume 2: Hardware specifications/descriptions
[NASA-CR-152288] N79-26069

Feasibility study for a numerical aerodynamic simulation facility. Volume 3: FMP language specification/user manual
[NASA-CR-152289] N79-26070

Numerical aerodynamic simulation facility feasibility study, executive summary
[NASA-CR-152284] N79-26071

Numerical aerodynamic simulation facility feasibility study
[NASA-CR-152285] N79-26072

Computer simulation of electron-beam-cavity interactions in coaxial geometry
[AD-A066130] N79-26255

Computational study of chemical reaction dynamics at the gas-solid interface
[AD-A067854] N79-26392

Digital simulation of snowmelt runoff
[PB-293252/3] N79-26457

Direct execution language architecture for simulation
[AD-A067824] N79-26793

Simulation of an information system with a distributed architecture
[FUB-34-1977] N79-26819

The use of simulation languages for studying digital direct control systems
[FUB-5-1978] N79-26821

Study of improved modeling and solution procedures for nonlinear analysis --- aircraft-like structures
[NASA-CR-158750] N79-26875

Low-power baseline test results for the GPU 3 Stirling engine
[NASA-TM-79103] N79-27023

COMPUTERS

A preliminary study of built-in-test for the Military Computer Family [MCF]
[AD-A067744] N79-26795

CONCENTRATION [COMPOSITION]

Stability evaluation of ambient concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide contained in compressed gas cylinders
[PB-292749/9] N79-26153

Thin-source concentration dependent diffusion --- using isotopic labeling for measuring the diffusion of calcium cations in sodium chloride
N79-26966

CONCENTRATORS

Analysis of flat mirror V-trough solar concentrator
N79-26472

CONCRETES

Performance study of continuously reinforced concrete pavement on I-95
[PB-292930/5] N79-26241

Continuously reinforced concrete overlays on existing Portland cement concrete pavements
[PB 293043/6] N79-26242

Warping torsion of reinforced concrete beams with thin-walled open sections
N79-26424

CONDENSATES

Formation and transformation of polycyclic organic matter from coal combustion
[COO-4347-1] N79-26145

CONDENSERS [LIQUIFIERS]

Data reduction in the eddy current testing of condenser tubes
[TDB-314] N79-26417

Evaluation of selected chemical processes for production of low-cost silicon, phase 3
[NASA-CR-158739] N79-26977

CONFERENCES

Control of forebody three-dimensional flow separations
[NASA-TM-78593] N79-26014

Proceedings of workshops to define engineering requirements for a space vacuum research facility
[NASA-CP-2091] N79-26076

Flight Mechanics/Estimation Theory Symposium --- with application to autonomous navigation and attitude/orbit determination
[NASA-CP-2082] N79-26082

Design of a 150 kWe distributed collector solar thermal power station
[AED-CONF-78-212-013] N79-26517

Proceedings of the Workshop on Mechanical Storage of Wind Energy
[SAND-79-0001] N79-26528

Proceedings: Third Workshop on catalytic combustion
[PB-293336/4] N79-26548

Proceedings of the Fifteenth International meeting on Alpine Meteorology, volume 1
[SZ-ISSN-0080-7346] N79-26623

Proceedings of a Workshop on Coastal Sediment Transport Study
[PB-293632/6] N79-26757

Plasma neutron diagnostic techniques with good spatial and energy resolution
[UCRL-81120] N79-26956

Thermodynamics and mechanisms of sintering
[LBL-8419] N79-26998

National Conference on Less Costly Wastewater Treatment Systems for Small Communities
[PB-293254/9] N79-27031

CONGRESSIONAL REPORTS

Executive energy documents
[GPO-24-112] N79-26507

Energy: Fiscal year 1980 budget request
[GPO-42-886] N79-26508

The National Energy Act
[GPO-36-956] N79-26509

Federal Information Centers Act
[S-REPT-95-1129] N79-27009

Annual report to the Congress for 1978 --- technology assessment
[PB-293088/1] N79-27027

CONICAL BODIES

Lifting bodies derived from supersonic flows past inclined circular and elliptic cones
[AD-A068003] N79-26026

Supersonic flow past conical bodies with nearly circular cross sections
[AD-A068004] N79-26027

CONICAL SHELLS

Hypersonic flow past a slender elliptic cone
[AD-A068002] N79-26028

CONJUGATES

Conjugate gradient type methods for unsymmetric and inconsistent systems of linear equations
[CTH-78.03-R] N79-26861

CONSTRAINTS

Development of an inflatable head/neck restraint system for ejection seats, update
[AD-A067124] N79-26038

CONSTRUCTION

Construction of a high performance resistojet for satellite propulsion
[PERME-TR-99] N79-26112

CONSTRUCTION MATERIALS

NASA workshop on outgassing
N79-26078

Hydrogen compatibility of structural materials for energy storage and transmission
[SAND-79-8200] N79-26183

CONTAINERS
Storage and disposal of radioactive waste as glass in canisters
[PNL-2764] N79-26911

CONTAMINANTS
Solvent removable coatings for contaminant protection of microcircuits
[AD-A067745] N79-26212
Fuel contaminants. Volume 3: Control of coal-related pollutants
[PB-293328/1] N79-26234

CONTINENTAL SHELVES
Tsunamis: The propagation of long waves onto a shelf
N79-26753

CONTOURS
Contour measurement system
[NASA-CASE-MFS-23726-1] N79-26439

CONTRACTS
FINCAP analysis: A method for financial capability analysis of Air Force contractors
[AD-A067998] N79-27006

CONTROL DATA [COMPUTERS]
Control procedures in block commutation networks, part 1
[FUB-8-1978] N79-26284

CONTROL EQUIPMENT
Assessment of the use of fugitive emission control devices
[PB-292748/1] N79-26551
Characterization of the EPA/IERL-RTP pilot-scale precipitation
[PB-292820/8] N79-26555

CONTROL THEORY
Optimal feedback controls for parameter identification
[AD-A067265] N79-26828
A general martingale approach to discrete time stochastic control and estimation
[AD-A067834] N79-26852
Multimodeling and multiparameter singular perturbation in control and game theory
N79-26873

CONVECTION
Unsteady turbulent thermal convection
N79-26344

CONVECTION CLOUDS
Chaff seeding in a dynamical-electrical cloud model
N79-26617
A contribution to the problem of parametrization of convection clouds in connection with macroscale circulation
N79-26668

CONVECTIVE HEAT TRANSFER
A control-volume based finite element method for convective heat and mass transfer
N79-26354
Heat transfer mediums
[P-52/D-08/77-10] N79-26367

CONVERGENCE
Zones of convergence in local air flow in valleys and basins
N79-26648
The intertropical convergence zone experiment: Background and summary
N79-26716
On the stability and convergence of self-tuning algorithms
[OUEL-1259/78] N79-26833

CONVERGENT-DIVERGENT NOZZLES
Effect of several geometric parameters on the static internal performance of three nonaxisymmetric nozzle concepts
[NASA-TP-1468] N79-26022

COOLANTS
Heat transfer mediums
[P-52/D-08/77-10] N79-26367
High temperature properties of nuclear reactor coolants and thermodynamic power cycle working Fluids --- in liquid metal fast breeder reactors
[COO-3027-37] N79-27001

COOLING SYSTEMS
Examination of specific aspects of cooling tower testing methodology
[EPRI-FP-953] N79-26545

COPOLYMERIZATION
The preparation and characterization of elastomers containing pendent sulfonic acid derivatives
N79-26206

COPPER
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach
N79-26169
Plated copper substrates for the LASL Antares CO2 laser system --- mirror design
[LA-UR-79-9] N79-26397
Cu-content of the liver of young mice in relation to a defect in the Cu-metabolism
[IRI-133-77-02] N79-26764

COPPER ALLOYS
Stress corrosion cracking of high strength Al-Zn-Mg-Cu alloys: Matrix precipitation
[RAE-TR-78110] N79-26174
Deposition of aluminum-copper alloy on laminated polyimide substrates from an RF induction source
[BDX-613-1993-REV] N79-26186

COPPER COMPOUNDS
Welding of copper silicon and zirconium II using the 1200 watt CO2 continuous laser
[UNI-1190] N79-26395

COPPER ISOTOPES
Results of a 64Cu-loading test applied to patients with an inherited defect in their Cu-metabolism [Menkes' disease]
[IRI-133-77-04] N79-26774
The oral 64Cu-loading test: Applications and problems
[IRI-133-78-02] N79-26775

CORE SAMPLING
Geotechnical aspects of subsurface seabed disposal of high level radioactive wastes --- core sampling
[COO-4069-1] N79-26918

CORONARY CIRCULATION
Influences of dietary fats on coronary flow rate and left ventricular work of the isolated rat heart
N79-26766
Effects of dietary fats on the coronary flow rate and the left ventricular function of the isolated rat heart
N79-26767

CORROSION RESISTANCE
Corrosion of nickel deposits in 40% KOH at 180 C, part 1
[P/539/77/31] N79-26191
The effect of grain structure on the stress corrosion resistance of Al-Zn-Mg-Cu alloys
[RAE-TR-78034] N79-26193
No more cadmium plating? Are there processes to replace it?
[DRIC-TRANS-5462] N79-26195
The resistance of ceramics to chemical attack
[NPL-CHEM-96] N79-26219

CORROSION TESTS
The effect of environmental variables on the pitting corrosion behavior of single and duplex phase 304L stainless steel
N79-26157
Fe-Cr-Ni stainless steel corrosion in 40% KOH at 150 C and 180 C, part 2
[P/539/77/38] N79-26192

COSMIC RAYS
Cosmic rays, volume 1. A bibliography with abstracts
[NTIS/PS-79/0386/7] N79-27059
Cosmic rays, volume 2. A bibliography with abstracts
[NTIS/PS-79/0387/5] N79-27060

COST ANALYSIS
Low cost space transportation
[TUM-LRT-TB-78/6-2] N79-26108
Lower cost by substituting steel for titanium
[AD-A067997] N79-26177
Comparison of different techniques for producing hydrogen: Production costs analysis
[P/51/76/14] N79-26240
Random vibration introduction: Environments, damaging effects, tests, test specifications and test economy
[ECR-84] N79-26435
Rankine-cycle component characteristics
N79-26478
SAMICS validation. SAMICS support study, phase 3
[NASA-CR-158746] N79-26491
Survey of disruption and consumer costs resulting from a major residential power outage
[ANL/EES-TM-29] N79-26520
Elements for technological and economic modeling of tower-type solar power plants
[P/51/76/17] N79-26535
Cost/benefit analysis of a solar power plant supplemented by diesel generation in comparison with a solely diesel system - optimizing for size and initial investment in an isolated area --- energy technology
[P/51/77/21] N79-26536
Typical costs for electric energy generation and environmental controls
[PB-293502/1] N79-26577
Product differentiation in computer services
N79-26824
SCATS: SRB Cost Accounting and Tracking System handbook
[NASA-TM-78302] N79-27002

COST EFFECTIVENESS
SEMTAP: A new technology transfer network to link business and industry with Federal research and development --- energy technology
[PB-292882/8] N79-27026

COST ESTIMATES
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919

COULOMB COLLISIONS
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898

COUPLING
Acoustic-to-seismic coupling properties and applications to seismic sensors
[AD-A067348] N79-26591

COUPLINGS
Prosthesis coupling
[NASA-CASE-KSC-11069-1] N79-26772

COVARIANCE
Varied applications of a new maximum-likelihood code with complete covariance capability
[HEDL-SA-1616-FP] N79-26818

COVERINGS
Continuously reinforced concrete overlays on existing Portland cement concrete pavements
[PB 293043/6] N79-26242

CRACK INITIATION
A study of the experimental implementation and the resulting characteristic behavior of the J-integral fracture toughness parameter applied to two controlled-rolled steels
N79-26170

CRACK PROPAGATION
The role of environment, frequency and wave shape during fatigue crack growth in aluminum alloys
[VTH-LR-270] N79-26187
Tearing instability of elastic-plastic crack growth
N79-26419
Evaluation of equivalent initial flaws for damage tolerance annalysis
[AD-A067566] N79-26431
Approximate method of elastic-plastic fracture analysis for nozzle corner cracks
[NUREG/CR-0472] N79-26433

CRACKING [FRACTURING]
Critical experiments, measurements and analyses to establish a crack arrest methodology for nuclear pressure vessel steels
[PB-292777/0] N79-26198
Solar cell modules with parallel oriented interconnections
[NASA-CR-158742] N79-26493

CRASHES
Study of improved modeling and solution procedures for nonlinear analysis --- aircraft-like structures
[NASA-CR-158750] N79-26875

CREEP ANALYSIS
A thermal activation analysis of cyclic creep in Al-4.6% Mg
N79-26418

CREEP PROPERTIES
A thermal activation analysis of cyclic creep in Al-4.6% Mg
N79-26418
A literature review on fatigue and creep interaction
[NASA-CR-135305] N79-26429

CROP DUSTING
System design requirements for advanced rotary-wing agricultural aircraft
[NASA-CR-158938] N79-26046

CROP GROWTH
Briefing Materials for Plenary Presentations: The LACIE Symposium
[E79-10217] N79-26444

CROSSED FIELD AMPLIFIERS
A dynamic crossed-field photomultiplier with an electron bombarded semiconductor collector
N79-26307

CROSSLINKING
Determination of crosslinking in high T sub g polymers
[AD-A067185] N79-26211

CROSSTALK
A longitudinal coupling mechanism in multi-pair cable crosstalk
N79-26249

CRUDE OIL
Relative chemical composition of selected synthetic crudes
[CONF-781150-4] N79-26231

CRYOGENIC WIND TUNNELS
Full-scale aircraft simulation with cryogenic tunnels and status of the National Transonic Facility
[NASA-TM-80085] N79-26064

CRYSTAL DEFECTS
Quantitative analysis of defects in silicon. Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158738] N79-26492
Quantitative analysis of defects in silicon: Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158724] N79-26980

CRYSTAL GROWTH
Silicon oxide studies: Physical modeling and device applications of thermal oxidation of heavily doped silicon
N79-26300
Superlattice formation in group 4-B transition metal dichalcogenides
N79-26971

Crystal growth and electrical properties of sputtered indium gallium antimonide thin films
N79-26974
Growth of high phase-match temperature LiNbO3 single crystals
[UCRL-13939] N79-26991
CRYSTAL LATTICES
Structure of 001 grain boundaries in bicrystalline thin films of gold
N79-26166
Surface studies of group IV-VI layered crystals
N79-26967
Renormalization group transformations for 7-spin triangular lattice
N79-26969
Superlattice formation in group 4-B transition metal dichalcogenides
N79-26971
CRYSTAL STRUCTURE
The effect of grain structure on the stress corrosion resistance of Al-Zn-Mg-Cu alloys
[RAE-TR-78034] N79-26193
Tetracarbon metallocarborances. 6: Stereochemical relationships between Co2C4B6 cage isomers formed by oxidative fusion. Crystal structure of [n5-C5h5]2Co2[CH3]4C4B6H6 isomer 5
[AD-A067836] N79-26989
Lattice parameters of iron-aluminum silicon alloys with the DO3 structure
[IS-T-831] N79-26992
CRYSTALLOGRAPHY
Characterization and effects of molecular orientation in amorphous polymers
N79-26204
Mathematical programming solution to the phase problem of crystallography
N79-26970
CULTURE TECHNIQUES
Fuels from solar energy: Photosynthetic systems: State of the art and potential for energy production
[COO-4151-2] N79-26230
CUMULUS CLOUDS
A study of conditional instability of the second kind and a numerical simulation of the intertropical convergence zone and easterly waves
N79-26583
CURING
Determination of crosslinking in high T sub g polymers
[AD-A067185] N79-26211
Microwave curing of epoxy resins
[AD-A067732] N79-26214
CURVE FITTING
Spline regression algorithms and local dependence
[AD-A067248] N79-26846
CYBERNETICS
Translations on USSR science and technology: Physical sciences and technology, no. 72
[JPRS-73663] N79-27064
CYCLIC HYDROCARBONS
Formation and transformation of polycyclic organic matter from coal combustion
[COO-4347-1] N79-26145
CYCLIC LOADS
Evaluation of flawed composite structural components under static and cyclic loading --- fatigue life of graphite-epoxy composite materials
[NASA-CR-135403] N79-26120
A thermal activation analysis of cyclic creep in Al-4.6% Mg
N79-26418
CYCLOGENESIS
Intensity of the lee-cyclogenesis over Northern Italy
N79-26629
CYCLONES
LFM 24-hour prediction of eastern Pacific cyclones refined by satellite images
[PB-294324/9] N79-26744
CYCLOTRON RESONANCE
Destruction of cyclotron resonances in weakly collisional, inhomogeneous plasmas
[AD-A067827] N79-26596
CYCLOTRONS
Theory of solid state cyclotron maser
[AD-A066174] N79-26389
CZOCHRALSKI METHOD
Continuous Czochralski growth. Silicon sheet growth development of the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158730] N79-26496
Growth of high phase-match temperature LiNbO3 single crystals
[UCRL-13939] N79-26991

D

DAMPING TESTS
Vibration isolation measurements on a precision machine tool
[LA-UR-78-3252] N79-26404
DATA ACQUISITION
HCMM Heat Capacity Mapping Mission
[E79-10214] N79-26441
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978 --- Colby, Kansas and Yuma, Colorado
[E79-10215] N79-26442
Future requirements and present perspectives in data handling for high energy physics experiments
[ISS-T-78/5] N79-26920
ATROPOS: A versatile data acquisition and analysis system
[SLAC-PUB-2220] N79-27019
A study of the pulsar in a binary system
N79-27039
DATA BASES
Handbook of data on selected engine components for solar thermal applications
[NASA-TM-79027] N79-26476
FQL a functional query language
[AD-A066992] N79-26812
A database interface to WAND for the network alerter service --- ARPA computer network
[AD-A066993] N79-27010
Q, a communications query language for SEED
[AD-A066994] N79-27011
Extensible data bases
[AD-A067015] N79-27012
Control programs and data structures for a multiple alerter implementation in a relational data base
[AD-A067168] N79-27013
The multiple path problem in data base schemata
[AD-A067147] N79-27015
Inventory of data bases, graphics packages, and models in Department of Energy laboratories
[ORNL-EIS-144] N79-27018
Data base available at the National Bureau of Standards Library
[PB-293170/7] N79-27021
DATA LINKS
Blue-green filter technology
[AD-A067789] N79-26931
DATA MANAGEMENT
A database interface to WAND for the network alerter service --- ARPA computer network
[AD-A066993] N79-27010
Control programs and data structures for a multiple alerter implementation in a relational data base
[AD-A067168] N79-27013
DATA PROCESSING
Navigation and attitude reference for autonomous satellite launch and orbital operations
N79-26089
Processing methodology for daily pluviometric data
[MN-MONO-102] N79-26619
Information technology and governmental reorganization: Summary of the Federal Data Processing Reorganization Project
[PB-294543/4] N79-26800
Modem identification experiments
[AD-A067538] N79-26829
Computer-aided investigation of reaction path synthesis
N79-26891
Future requirements and present perspectives in data handling for high energy physics experiments
[ISS-T-78/5] N79-26920
SCATS: SRB Cost Accounting and Tracking System handbook
[NASA-TM-78302] N79-27002
Advanced information processing using microarchitecture programmed design
N79-27008
ATROPOS: A versatile data acquisition and analysis system
[SLAC-PUB-2220] N79-27019
DATA PROCESSING EQUIPMENT
AN/UYA-7 interface for USAF HF aeronautical stations
[AD-A067148] N79-26259
DATA RECORDING
The design of a high packing density PCM magnetic tape replay system
[RAE-TR-77140] N79-26378
DATA REDUCTION
Data reduction in the eddy current testing of condenser tubes
[TDB-314] N79-26417
Structuring of data systems: Psychophysiological data from the dynamic flight simulator
[AD-A067175] N79-27014
DATA SAMPLING
Device technology for high performance monolithic sample-and-hold circuits
[AD-A067786] N79-26324
Spectral estimation using Poisson distributed time series data with time quantization
[AD-A067324] N79-26867
DATA STORAGE
Multichannel pressure sampling and storage system
[TDB-318] N79-26380
Simulation of an information system with a distributed architecture
[FUB-34-1977] N79-26819
A information retrieval system for research file data --- utilizing a computer program
[AD-A068021] N79-27017
DATA SYSTEMS
Automatic data structure choice in SETL
N79-26802
ATROPOS: A versatile data acquisition and analysis system
[SLAC-PUB-2220] N79-27019
DATA TRANSMISSION
Control procedures in block commutation networks, part I
[FUB-8-1978] N79-26284
Error rate estimation method based on the detection of line coding violations
[FUB-11-1978] N79-26286
Comments on repeater distance dimensioning in coaxial cable digital data transmission
[FUB-26-1977] N79-26337
Criteria for the dimensioning of numerical multiplexing frames
[FUB-27-1977] N79-26859
DECELERATION
Parachutes and decelerators, volume 2. A bibliography with abstracts
[NTIS/PS-79/0368/5] N79-26033
DECISION MAKING
SAMICS validation. SAMICS support study, phase 3
[NASA-CR-158746] N79-26491
Adaptive allocation of decision making responsibility between human and computer in multitask situations
N79-26827
Model management systems: A framework for development
[AD-A067246] N79-27003
A comparison of heuristic methods used in hierarchical production planning
[AD-A066932] N79-27004
FINCAP analysis: A method for financial capability analysis of Air Force contractors
[AD-A067998] N79-27006
Information flow and analysis: Theory simulation, and examples. Part 1: Basic theoretical and conceptual development. Part 2: Simulation, examples and results
[PB-293458/6] N79-27007
Future directions for public transportation: A basis for decision
[PB-292781/2] N79-27024
Annual report to the Congress for 1978 --- technology assessment
[PB-293088/1] N79-27027
DECISION THEORY
Decision problems in multistatic sonar systems
[ISS-R-78/4] N79-26889
Information flow and analysis: Theory simulation, and examples. Part 1: Basic theoretical and conceptual development. Part 2: Simulation, examples and results
[PB-293458/6] N79-27007
Extensible data bases
[AD-A067015] N79-27012
DECOMPOSITION
The decomposition of polycyclic organic matter adsorbed on coal fly ash
N79-26119
Flame retardation of polymers
N79-26205
DEFECTS
Evaluation of flawed composite structural components under static and cyclic loading --- fatigue life of graphite-epoxy composite materials
[NASA-CR-135403] N79-26120
Flaw evaluation procedures --- inspecting nuclear power plant components
[EPRI-NP-719-SR] N79-26415
Italian noise legislation: Defects and insufficiencies of present situation
[FUB-18-1978] N79-26550
DEFLECTION
Single disc springs: Elastic deflections, stresses, stiffnesses and resiliences
[ESDU-78043] N79-26421
DEFORMATION
High temperature deformation of solid solution strengthened superalloys --- nickel-base Hastelloy alloy C-276 and cobalt-base Haynes alloy No. 188
N79-26165
Computer-aided analysis and design of the shape rolling process for producing turbine engine airfoils
[NASA-CR-135367] N79-26175
Polyethylene deformation analysis
N79-26425
DEICERS
Helicopter Icing Symposium
[AD-A067981] N79-26048
Icing tests of a UH-1H helicopter with an electrothermal ice protection system under simulated and natural icing conditions
[AD-A067737] N79-26050
DELAY
Analysis of a model for the interpretation of chromatic delay in light emitting diodes
[FUB-31-1977] N79-26338
DELTA MODULATION
Adaptive delta modulation: Digital filtering and the effects of random channel errors
N79-26310

DENMARK
Thule Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-131-6] N79-26601
Thule Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-133-2] N79-26603
Rude Skov Geophysical Observatory: Magnetic results, 1976
[ISBN-87-7478-150-2] N79-26608
DENSITY [MASS/VOLUME]
Study of a density cell to measure suspended load
[PB-292954/5] N79-26452
DEPOSITION
Droplet mixing and deposition in a turbulent flow N79-26356
DESIGN ANALYSIS
Solar cell modules with parallel oriented interconnections
[NASA-CR-158742] N79-26493
The design and implementation of software for unconstrained optimization
[NPL-DNACS-8/78] N79-26820
Design method for the layout of quasi optical elbows in a connection with circular wave guides
[FUB-6-1978] N79-26934
DESULFURIZING
Fuel contaminants. Volume 3: Control of coal-related pollutants
[PB-293328/1] N79-26234
Evaluation of available MHD seed-regeneration processes on the basis of energy considerations
[ANL/MHD-78-4] N79-26519
Disposal of by-products from nonregenerable flue gas desulfurization systems
[PB-293163/2] N79-26575
DETONATION
Fabrication of manganin stress gauges for use in detonating high explosives
[UCRL-81371] N79-26377
DEUTERIUM
Atomic reaction rates in H[-] and D[-] plasmas
[UCID-18031] N79-26948
DEVELOPING NATIONS
AID's remote sensing grant program
[PB-292872/9] N79-26456
DIAGNOSIS
Laser fusion diagnostics
[UCRL-81099-REV-1] N79-26949
DIELECTRIC PROPERTIES
Microwave curing of epoxy resins
[AD-A067732] N79-26214
DIESEL ENGINES
Combustion optimization studies for stratified charge and diesel engines
[COO-4191-1] N79-26149
Cost/benefit analysis of a solar power plant supplemented by diesel generation in comparison with a solely diesel system - optimizing for size and initial investment in an isolated area --- energy technology
[P/51/77/21] N79-26536
DIESEL FUELS
Experimental clean combustor program: Diesel no. 2 fuel addendum, phase 3
[NASA-CR-135413] N79-26221
DIETS
Influences of dietary fats on coronary flow rate and left ventricular work of the isolated rat heart N79-26766
Effects of dietary fats on the coronary flow rate and the left ventricular function of the isolated rat heart N79-26767
Effects of dietary fats on atherosclerosis and thrombosis N79-26776
Physiological effects of a high soybean protein diet in man N79-26777
DIFFERENTIAL CALCULUS
Contact spaces for singularities over perfect fields N79-26834
DIFFERENTIAL EQUATIONS
The use of simulation languages for studying digital direct control systems
[FUB-5-1978] N79-26821
The elastic-plastic dangling spider problem N79-26835
A perturbation method for the periodic solutions of a discontinuous system of differential equations N79-26837
Identification of parameters in distributed systems using finite element method N79-26842
The stability of second order quadratic differential equations, part 2
[AD-A067813] N79-26851
Relationship between Dirac and matrix Schroedinger inverse scattering transforms
[PM/78/6] N79-26854
Resistive ballooning mode equation
[ORNL-TM-6629] N79-26954
DIFFERENTIAL GEOMETRY
Bloch functions in several complex variables N79-26876
DIFFUSION
Steady state and stability characteristics of catalytic arrays N79-26129
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach N79-26169
DIFFUSION COEFFICIENT
A study of metal-oxygen solid solutions utilizing solid electrolytic cells N79-26160
DIFFUSIVITY
Diffusivity and solubility of nitrogen in multi-component liquid iron alloys containing alloying elements up to 50 wt% at 1600 C N79-26162
DIGITAL COMPUTERS
Commercial digital/ADP equipment in an ocean environment. Volume 1: Performance study
[AD-A067662] N79-26796
Advanced information processing using microarchitecture programmed design N79-27008
DIGITAL FILTERS
A comparison of filtering algorithms for GPS satellite navigation application N79-26094
Adaptive delta modulation: Digital filtering and the effects of random channel errors N79-26310
An iterative interpolation technique using finite impulse response digital filters
[AD-A067511] N79-26322
DIGITAL SYSTEMS
An experimental comparison of the readability of two digital altimeters
[ARL/SYS-NOTE-60] N79-26053
Quantization for statistical classification N79-26250
Report on collaboration activity between the 'Istituto Superiore Poste e Telecomunicazioni' and the Ugo Bordoni Foundation in 1977 N79-26275
Considerations about 2.6/9.5 coaxial cable characterization related to high capacity digital systems carrier utilization
[FUB-7-1978] N79-26283
Control procedures in block commutation networks, part I
[FUB-8-1978] N79-26284
An accurate reliability modeling technique for hybrid modular redundant digital systems using modular characteristic error parameters N79-26413
The use of simulation languages for studying digital direct control systems
[FUB-5-1978] N79-26821
DIGITAL TECHNIQUES
A digital scene matching technique for geometric image correction and autonomous navigation N79-26085
Manually digitized radar data: Interpretation and application
[PB-293810/8] N79-26747
Criteria for the dimensioning of numerical multiplexing frames
[FUB-27-1977] N79-26859
DIPOLE ANTENNAS
Near-field radiation properties of simple linear antennas with applications to radiofrequency hazards and broadcasting
[PB-292647/5] N79-26290
DIRAC EQUATION
Relationship between Dirac and matrix Schroedinger inverse scattering transforms
[PM/78/6] N79-26854
DISCRETE FUNCTIONS
Stable discrete adaptive control
[AD-A067812] N79-26831
DISINTEGRATION
Electrodisintegration of few-body systems and realistic interactions
[ISS-P-78/11] N79-26901
DISPLAY DEVICES
A simulation investigation of cockpit display of aircraft traffic during curved, descending, decelerating approaches
[NASA-TM-80098] N79-26052
CAT information display system users manual
[NASA-CR-161243] N79-26711
A photometric and legibility assessment of Aerospace Optics, Incorporated Vivisun 20/20 display
[AD-A067668] N79-26786
DISSOCIATION
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898
DISTORTION
Determination of the statistical properties of the digital sum of line codes to evaluate the relative average increase in error probability due to low frequency distortion in data transmission
[FUB-3-1978] N79-26281
DISTRIBUTED PARAMETER SYSTEMS
A study of the construction of a distributive processing system using standard components N79-26791
Identification of parameters in distributed systems using finite element method N79-26842
DISTRIBUTION [PROPERTY]
A framework for problem-solving in a distributed processing environment N79-26807
DISTRIBUTION FUNCTIONS
The effect of ground relief upon the extreme values of intensity and duration of precipitation in Belgium. Methods and results N79-26697
DIURNAL VARIATIONS
Day-to-day variations or atmospheric tides as observed by meteor radar
[UILU-ENG-79-2506] N79-26588
Tropospheric radiative divergence during phase 3 of the GARP Atlantic Tropical Experiment [GATE]
[PB-292761/4] N79-26609
Daily variation of near-surface ozone at mountain stations N79-26642
Diurnal variability in the GATE [GARP Atlantic Tropical Experiment] region
[PB-292998/2] N79-26751
DOMES [GEOLOGY]
Scoping study of salt domes, basalts and crystalline rock as related to long term risk modeling for deep geologic disposal of nuclear waste
[UCRL-13945] N79-26907
DOPED CRYSTALS
Doping process in silicon epitaxy: Transfer function and physicochemical model N79-26976
DOPPLER RADAR
On-board orbit determination for application satellites N79-26093
A contribution to the severe storms intercept project, 1978
[PB-293472/7] N79-26741
DOSIMETERS
A preliminary study on the dosimetric properties of CaSO4: Dyribbon [TLD-900]
[ISS-P-78/14] N79-26902
DRAG REDUCTION
Jet simulation techniques: Simulation of temperature effects by altering gas composition
[AD-A067084] N79-26362
DRAINAGE
Distributed routing rainfall-runoff model
[PB-292303/5] N79-26451
Digital simulation of snowmelt runoff
[PB-293252/3] N79-26457
Interactive multiple objective optimization
[PB-293211/9] N79-26468
Study of water drainage from columns of snow
[AD-A066935] N79-26590
Development of a drainage with flood control management system for urbanizing communities N79-27022
DRAINAGE PATTERNS
Evaluation of the effects of urbanization on stormwater runoff and quality
[PB-293513/8] N79-27035
DROPS [LIQUIDS]
Droplet mixing and deposition in a turbulent flow N79-26356
Airborne measurements in support of a field test of the stabilization of supersized water droplets: Pilot experiment
[AD-A067645] N79-26735
DUCTED FANS
Development of a test facility for investigating the relations between noise and inflow disturbance in an aircraft propulsion fan
[TT-7805] N79-26066
DUPLEX OPERATION
An investigation of duplex weld solidification in austenitic stainless steels N79-26158
DUST
Transport and deposition of Saharan dust over Alps N79-26670
DYNAMIC CHARACTERISTICS
A singular perturbation approach to power system dynamics N79-26294
Dynamic analysis and design sensitivity analysis of mechanisms with intermittent motion N79-26399
Certain characteristics of the atmospheric turbidity N79-26683
DYNAMIC MODELS
The dynamic modelling of a slotted test section
[NASA-CR-159069] N79-26065
Simple models for computing dynamic responses of complex frame structures
[PB-292798/6] N79-26243

Development of linear and nonlinear magnetic circuit models for the prediction of step motor static performance
N79-26297
An accurate reliability modeling technique for hybrid modular redundant digital systems using modular characteristic error parameters
N79-26413
Chaff seeding in a dynamical-electrical cloud model
N79-26617

DYNAMIC MODULUS OF ELASTICITY
Some applications of Green's functions to the study of the effects of surfaces on the dynamical properties of elastic solids
N79-26973

DYNAMIC PROGRAMMING
The design and implementation of software for unconstrained optimization
[NPL-DNACS-8/78] N79-26820

DYNAMIC RESPONSE
Wind excited motion of buildings
N79-26239
Theoretical study of the dynamic response of a chimney to earthquake and wind
[PB-293561/7] N79-26244
Investigations into the mechanical behavior of composite bolted joints
[NASA-CR-158752] N79-26402
Dynamic analysis to establish normal shock and vibration of radioactive material shipping packages --- mechanical shock during rail transportation
[PB-293660/7] N79-26409
Estimation for uncertain linear systems with jump parameters
N79-26874

DYNAMIC STABILITY
Stability calculations for MHD magnets
[CONF-781055-4] N79-26960

DYNAMIC STRUCTURAL ANALYSIS
Theoretical study of the dynamic response of a chimney to earthquake and wind
[PB-293561/7] N79-26244
Structural design of flexible pavement. Part 3: Analysis of performance study data
[PB-292838/0] N79-26246
Analysis of rigid pavement on viscoelastic foundation subjected to moving loads
N79-26422
Structural dynamics, stability and control of high aspect ratio wind turbine generators
N79-26471

E

EARTH [PLANET]
The dc magnetic field observations at the earth's bow shock
[LPS-78-5] N79-27050

EARTH ATMOSPHERE
The relationship of the thermal regime of the soil to the extrinsic environment, with special reference to the north central United States
N79-26582

EARTH RESOURCES
Land and natural resources management: An analysis of selected Federal policies programs, and planning mechanisms. Report to the President's Interagency Task Force on Environmental Data and Monitoring Programs
[PB-292500/6] N79-26449
Lake Champlain islands report
[PB-293441/2] N79-26463

EARTH RESOURCES PROGRAM
AID's remote sensing grant program
[PB-292872/9] N79-26456

EARTH SATELLITES
A fast method for determining the mean orbital elements of an earth satellite
[REPT-3-78] N79-26099

EARTH SURFACE
Research on severe local storms --- corona probe to measure electric fields at earth surface
[PB-293924/7] N79-26748

EARTHQUAKE RESISTANT STRUCTURES
Simple models for computing dynamic responses of complex frame structures
[PB-292798/6] N79-26243
Theoretical study of the dynamic response of a chimney to earthquake and wind
[PB-293561/7] N79-26244

EARTHQUAKES
Determination of the seismic design parameters: A stochastic approach
N79-26585
On the development of strong-motion instrument networks in the United States
[PB-293579/9] N79-26612

ECHOES
Echo tracker/range finder for radars and sonars
[NASA-CASE-NPO-14361-1] N79-26253

ECOLOGY
An evaluation of the effects of geothermal energy development on aquatic biota in the geysers area of California
[PB-293031/1] N79-26562

ECONOMIC ANALYSIS
The production of ethanol from agricultural waste: An economic evaluation
[PB-292552/7] N79-26233

ECONOMIC DEVELOPMENT
SEMTAP: A new technology transfer network to link business and industry with Federal research and development --- energy technology
[PB-292882/8] N79-27026
City-wide Development Corporation development services package
[PB-292972/7] N79-27028

ECONOMIC IMPACT
Chemical technology and economics in environmental perspective. Task 1: Analysis of the sources of phosphorus in the environment
[PB-293376/0] N79-26568

ECOSYSTEMS
Ten-Ecosystem Study [TES] site 9, Washington County, Missouri
[E79-10218] N79-26445

EDDY CURRENTS
Data reduction in the eddy current testing of condenser tubes
[TDB-314] N79-26417

EIGENVALUES
Linear state feedback, quadratic weights, and closed loop eigenstructures
[NASA-CR-158755] N79-26844
Kronecker's canonical form and the QZ algorithm
[NPL-DNACS-10/78] N79-26863

EIGENVECTORS
Linear state feedback, quadratic weights, and closed loop eigenstructures
[NASA-CR-158755] N79-26844

EISCAT RADAR SYSTEM [EUROPE]
SNR for the EISCAT UHF system
[KWI-78-1] N79-26266

EJECTION SEATS
Feasibility of non-catapult ejection and hazard of an ejection seat rocket plume
[AD-A067080] N79-26036
Development of an inflatable head/neck restraint system for ejection seats, update
[AD-A067124] N79-26038

ELASTIC BODIES
Some applications of Green's functions to the study of the effects of surfaces on the dynamical properties of elastic solids
N79-26973

ELASTIC PROPERTIES
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208
Design charts for torsional properties of non-circular shafts --- stress analysis
[AD-A064109] N79-26401

ELASTIC SCATTERING
Implications of nucleon-nuclear spin-polarization measurements
[ANL-HEP-CP-78-48] N79-26915

ELASTOMERS
The preparation and characterization of elastomers containing pendent sulfonic acid derivatives
N79-26206

ELASTOPLASTICITY
Tearing instability of elastic-plastic crack growth
N79-26419
Approximate method of elastic-plastic fracture analysis for nozzle corner cracks
[NUREG/CR-0472] N79-26433
Elastic-plastic tension-torsion in a circular bar of rate-sensitive material
[OUEL-1265/78] N79-26436
The elastic plastic dangling spider problem
N79-26835

ELECTRIC CHARGE
Theory of charge pumping in MOS transistors
N79-26301

ELECTRIC CHOPPERS
Performance of a 14.9-kW laminated-frame dc series motor with chopper controller
[NASA-TM-79177] N79-26316

ELECTRIC CORONA
Research on severe local storms --- corona probe to measure electric fields at earth surface
[PB-293924/7] N79-26748

ELECTRIC DISCHARGES
Theory of charge pumping in MOS transistors
N79-26301
An investigation of the atomic fluorine laser excited in a hollow cathode discharge
N79-26383

ELECTRIC ENERGY STORAGE
Electrochemical cell for rebalancing REDOX flow system
[NASA-CASE-LEW-13150-1] N79-26474

ELECTRIC FIELDS
Corona performance of toroidal electrodes for high voltage equipment
N79-26309
Chaff seeding in a dynamical-electrical cloud model
N79-26617
Research on severe local storms --- corona probe to measure electric fields at earth surface
[PB-293924/7] N79-26748
Low frequency phenomena in smectic A liquid crystals
N79-26993

ELECTRIC FILTERS
A determination of the first two moments of the ale output detector
[AD-A067213] N79-26320

ELECTRIC GENERATORS
An investigation of power suck-out in helix traveling-wave tubes
[AD-A067916] N79-26326
Computation of the equilibrium points in an electric network with many machines
[FUB-2-1978] N79-26340
Solar thermal power-conversion system
N79-26477
Commercial synchronous alternating-current generators
N79-26482
Power-conversion system component summation
N79-26483
Candidate power-conversion system cycles, appendix A
N79-26484
Central receiver thermal power system
[AED-CONF-78-212-008] N79-26513

ELECTRIC MOTORS
Performance of a 14.9-kW laminated-frame dc series motor with chopper controller
[NASA-TM-79177] N79-26316

ELECTRIC NETWORKS
Computation of the equilibrium points in an electric network with many machines
[FUB-2-1978] N79-26340

ELECTRIC POWER
System study on the feasibility of a coal-fired total-energy plant [with solar options] for Sandia Laboratories
[SAND-78-0979] N79-26530
Development of an electrical energy converter for driving left heart assist blood pumps
[PB-293510/4] N79-26780

ELECTRIC POWER PLANTS
Simple models for computing dynamic responses of complex frame structures
[PB-292798/6] N79-26243
Nuclear closed-cycle gas turbine [GT-HTGR]: A utility power plant for the year 2000
[GA-A-15184] N79-26515
Typical costs for electric energy generation and environmental controls
[PB-293502/1] N79-26577

ELECTRIC POWER SUPPLIES
Transient attenuation of power supplies: A theoretical and practical evaluation of a power supply's ability to prevent coupling of transient from mains network into the DC output
[ECR-83] N79-26334
Electric power from laser fusion: The HYLIFE concept
[UCRL-81259-REV-1] N79-26524

ELECTRIC PULSES
Theory of charge pumping in MOS transistors
N79-26301

ELECTRIC WIRE
Degradation mechanism of Nb3Sn composite wires under tensile strain at 4.2 K
[BNL-24957] N79-26184

ELECTRICAL PROPERTIES
The NRL program on electroactive polymers
[AD-A067736] N79-26213
Atomic and electrical profile studies of ion-implanted semiconductors
N79-26303
Electrical characterization of standard and radiation-hardened RCA CDP1856D 4-BIT, CMOS, bus buffer/separator
[NASA-CR-158725] N79-26314
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158740] N79-26490
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158735] N79-26495
Crystal growth and electrical properties of sputtered indium gallium antimonide thin films
N79-26974
Study of electronic transport and breakdown in thin insulating films
[AD-A066918] N79-26984

ELECTRICAL RESISTIVITY
Studies of high-dose ion implantation in silicon --- differential resistivity, Hall effect, and spectroscopic analysis
N79-26975

ELECTRO-OPTICS
Blue-green filter technology
[AD-A067789] N79-26931
ELECTROCHEMICAL CELLS
Electrochemical cell for rebalancing REDOX flow system
[NASA-CASE-LEW-13150-1] N79-26474
ELECTROCHEMICAL CORROSION
Nickel plating, volume 2
[P/539/77/28] N79-26190
Corrosion of nickel deposits in 40% KOH at 180 C, part 1
[P/539/77/31] N79-26191
ELECTROCHEMISTRY
Technology advancement of the electrochemical CO2 concentrating process
[NASA-CR-152250] N79-26135
Electrochemical and spectral investigations of Ni[II] ion equilibria in room temperature chloroaluminate solvents
[AD-A067782] N79-26138
Thermodynamic and kinetic investigations of liquid metal-oxygen systems using solid state electrochemical methods
N79-26171
Slotting by electrochemical grinding
[BDX-613-1908-REV] N79-26405
ELECTROLYSIS
Interband transitions of semiconducting oxides determined from photoelectrolysis spectra
[AD-A066188] N79-26982
ELECTROLYTIC CELLS
Thermoplastic materials: Water electrolysis
[P/539/77/06] N79-26152
A study of metal-oxygen solid solutions utilizing solid electrolytic cells
N79-26160
Oxygen overvoltage on nickel and the 50-50 Ni-Fe alloy in 40% KOH at 80 C. Role of oxide films
[P/539/77/13] N79-26189
Nickel plating, volume 2
[P/539/77/28] N79-26190
Pressurized water electrolysis test circuit: Initial operating results
[P/539/77/12] N79-26335
The use of fuel cell ion exchange membranes in electrolytic cells
[P/539/77/23] N79-26532
Hydrogen electrode and nickel boride alloys
[P/539/77/30] N79-26533
Evaluation of selected chemical processes for production of low-cost silicon, phase 3
[NASA-CR-158739] N79-26977
ELECTROMAGNETIC ABSORPTION
Some significant ionospheric disturbance events during September 1977
[UIO-SR-78-05] N79-26600
Laser assisted semiconductor device processing --- energy transfer, thermal properties, and photon absorption
[AD-A067183] N79-26988
ELECTROMAGNETIC COMPATIBILITY
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 1: Non-military standards and national regulations. Survey of international and national standards and regulations on electrical interference and susceptibility
[ECR-79-PT-1] N79-26268
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 2: Military and special industrial standards, regulations, and reccomendations international and national standards, regulations, and recommendations on electrical interference and susceptibility
[ECR-80-PT-2] N79-26269
Transient attenuation of power supplies: A theoretical and practical evaluation of a power supply's ability to prevent coupling of transient from mains network into the DC output
[ECR-83] N79-26334
ELECTROMAGNETIC FIELDS
Near-field radiation properties of simple linear antennas with applications to radiofrequency hazards and broadcasting
[PB-292647/5] N79-26290
Source excitation of an open, parallel-plate waveguide. Numerical results
[AD-A067787] N79-26323
ELECTROMAGNETIC INTERFERENCE
Radar system analysis algorithms: Radar system analysis models of performance degradation by mutual interference
[AD-A068019] N79-26363
ELECTROMAGNETIC NOISE
Improvements in high injection transistor noise theory and models
N79-26299
ELECTROMAGNETIC PULSES
On the limits of applicability of the space-charge-limited P-dot driver
[AD-A066131] N79-26104
Computer simulation of electron-beam-cavity interactions in coaxial geometry
[AD-A066130] N79-26255
ELECTROMAGNETIC RADIATION
Propagation of noise in the far field from electric transformers
N79-26293
Collective radio-emission from plasmas
[AD-A066923] N79-26944
ELECTROMAGNETIC SCATTERING
Extrapolation of induced transient surface currents on a scatterer to general band limited excitation conditions
[AD-A067672] N79-26265
ELECTRON BEAMS
Computer simulation of electron-beam-cavity interactions in coaxial geometry
[AD-A066130] N79-26255
Fresnel zone lens fabricated by electron beam lithography in thin film waveguide
N79-26305
Free electron lasers and stimulated scattering from relativistic electron beams
[AD-A066177] N79-26387
Theory of solid state cyclotron maser
[AD-A066174] N79-26389
ELECTRON BOMBARDMENT
A review of the UK T5 electron-bombardment mercury ion thruster
[RAE-TR-77191] N79-26109
A dynamic crossed-field photomultiplier with an electron bombarded semiconductor collector
N79-26307
ELECTRON CLOUDS
Gabor lens theory
[BNL-25023] N79-26913
ELECTRON DENSITY PROFILES
Accurate determination of ionospheric effects on satellite based positioning systems using a versatile three-dimensional ray tracing program
[UIO-SR-78-04] N79-26267
ELECTRON ENERGY
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
[LBL-8294] N79-26142
Theory of thermionic energy converter with variable plasma electron temperature
[COO-2533-10] N79-26521
ELECTRON SCATTERING
Free electron lasers and stimulated scattering from relativistic electron beams
[AD-A066177] N79-26387
ELECTRON STATES
Effects of surface states on the low frequency transfer inefficiency in CCD's
N79-26302
Electronically induced phase transformations --- in rare earth superdonducting compounds
[AD-A067066] N79-26983
ELECTRON TRANSFER
Transient radiation and dose-enhancement effects in transistors
[AD-A067629] N79-26313
Study of electronic transport and breakdown in thin insulating films
[AD-A066918] N79-26984
ELECTRONIC EQUIPMENT
EMS [Electronic Message Service]: System definition and evaluation. Executive summary
[PB-292933/9] N79-26291
EMS [Electronic Message Service]: System definition and evaluation
[PB-292934/7] N79-26292
Experimental performance measurements of Adaptive Noise Canceller [ANC]: Various inputs and internal parameters correspond with existing theory
[AD-A067977] N79-26325
Quantitative comparison of electronic component-solder joint stress relief in encapsulated assemblies
[BDX-613-1868-REV] N79-26333
ELECTRONIC PACKAGING
Prelidding burn-in evaluation
[AD-A067224] N79-26318
Solar cell modules with parallel oriented interconnections
[NASA-CR-158742] N79-26493
ELECTROPHORESIS
Investigation of the free flow electrophoretic process. Volume 1: Executive summary
[NASA-CR-161241] N79-26132
Investigation of the free flow electrophoretic process. Volume 2: Technical analysis
[NASA-CR-161240] N79-26133
Evaluation of surface properties in SPAR electrophoresis --- laxtex coatings and particle motion
[NASA-CR-161248] N79-26136
ELECTROSTATIC ENGINES
Inert gas thrusters
[NASA-CR-159527] N79-26110
ELECTROSTATIC PRECIPITATORS
Characterization of the EPA/IERL-RTP pilot-scale precipitation
[PB-292820/8] N79-26555
ELECTROSTATIC SHIELDING
Corona performance of toroidal electrodes for high voltage equipment
N79-26309
ELECTROSTATIC WAVES
Experimental observation of strong profile modification of an inhomogeneous plasma due to intense microwaves
N79-26941
ELEMENTARY PARTICLE INTERACTIONS
Weak interactions at high energies --- broken gauge theory and elementary particle interactions
[SLAC-PUB-2177] N79-26914
ELLIPSOMETERS
Ellipsometry as a tool to study the adsorption behavior of synthetic and biopolymers at the air-water interface
N79-26217
EMBRITTLEMENT
Evolution of the properties and structure of 17Cr-13Ni-Mo very low carbon austenitic stainless steel during high temperature exposure --- fast nuclear reactors
N79-26188
EMISSION
Control of sulfur dioxide and particulate emission in MHD power systems using high sulfur coal
[CONF-781109-18] N79-26546
EMISSION SPECTRA
Collective radio-emission from plasmas
[AD-A066923] N79-26944
Variability of Lyman-alpha emission from Jupiter
[NASA-CR-158756] N79-27045
ENCAPSULATING
Investigation of test methods, material properties, and processes for solar cell encapsulants
[NASA-CR-158741] N79-26494
ENERGETIC PARTICLES
Solar-geophysical data number 414 [supplement], February 1979. Part 1: Prompt Reports. Data for December 1978 - January 1979
[PB-294770/3] N79-27054
Solar-geophysical data number 414 [supplement], February 1979. Part 2: Comprehensive reports. Data for August - July 1978 and miscellanea
[PB-294771/1] N79-27055
Solar-geophysical data number 414 [supplement], February 1979: Explanation of data reports
[PB-294772/9] N79-27056
ENERGY BUDGETS
Energy balance of an Alpine pasture, illustrated by an example for a day of the 1976 dryness period
N79-26687
ENERGY CONSERVATION
Fuel-conservative guidance system for powered-lift aircraft
[NASA-TM-78595] N79-26009
Executive energy documents
[GPO-24-112] N79-26507
Use of waste heat from nuclear power plants
[CONF-7811109-4] N79-26527
CSIR annual report, 1978 --- research and development activities in the Republic of South Africa
[AR-34] N79-27051
ENERGY CONVERSION
Laboratory study of pyrolysis of explosive contaminated waste
[AD-A066973] N79-26222
Process design for coal conversion reactors
[CONF-781110-15] N79-26232
A pilot study of the potential for Navy utilization of solid waste derived fuels to offset fossil fuels consumption
[AD-A067165] N79-26510
HYCSOS chemical heat pump and energy conversion system
[CONF-781142-7] N79-26529
Development of an electrical energy converter for driving left heart assist blood pumps
[PB-293510/4] N79-26780
ENERGY CONVERSION EFFICIENCY
Preparation and properties of Au-[-n] A sub X Ga sub 1 minus X aS-[n]GaAs Schottky-Barrier solar cells
N79-26473
Method of construction of a multi-cell solar array
[NASA-CASE-MFS-23540-1] N79-26475
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158736] N79-26488
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158740] N79-26490
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158735] N79-26495
Array automated assembly, phase 2
[NASA-CR-158728] N79-26498
Analysis of helio-thermoelectrical energy conversion efficiency
[REPT-77/HP-40-241] N79-26534
Quantitative analysis of defects in silicon: Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158724] N79-26980
ENERGY DISSIPATION
Performance of low thrust attitude control engines. Part 5: Thrust loss determination by test-data-correlation
[TUM-LRT-TB-78/1-PT-5] N79-26117

Survey of disruption and consumer costs resulting from a major residential power outage
[ANL/EES-TM-29] N79-26520
ENERGY POLICY
Characterization of multialkylated polycyclic aromatic hydrocarbons in energy-related materials
[CONF-781039-9] N79-26147
Coal liquefaction test center
[FE-1517-67] N79-26226
Executive energy documents
[GPO-24-112] N79-26507
Energy: Fiscal year 1980 budget request
[GPO-42-886] N79-26508
The National Energy Act
[GPO-36-956] N79-26509
Proposal to the United States Energy Research and Development Administration for continuation of fusion reactor technology studies
[COO-4636-1] N79-26511
LLL wind energy studies [OAHU]
[UCRL-82171] N79-26514
Cost/benefit analysis of a solar power plant supplemented by diesel generation in comparison with a solely diesel system - optimizing for size and initial investment in an isolated area --- energy technology
[P/51/77/21] N79-26536
Study of low output solar energy power plants
[P/51/77/24] N79-26537
Department of Energy policy for fusion energy
[DOE/ER-0018] N79-26952
ENERGY REQUIREMENTS
Evaluation of available MHD seed-regeneration processes on the basis of energy considerations
[ANL/MHD-78-4] N79-26519
ENERGY SPECTRA
The optimal line for turbulent wind oscillations determined from energy spectra
N79-26643
Beam foil spectroscopy of heavy ions at energies from 20 to 238 MeV
[BNL-24909] N79-26916
Expected muon spectra at two different latitudes
[KGI-77-2] N79-27058
ENERGY STORAGE
Hydrogen compatibility of structural materials for energy storage and transmission
[SAND-79-8200] N79-26183
Recent advances in redox flow cell storage systems
[NASA-TM-79186] N79-26505
Metal hydride research and development program at Brookhaven National Laboratory
[BNL-25215] N79-26516
Hydrogen storage devices for automobiles
[BNL-25263] N79-26518
Proceedings of the Workshop on Mechanical Storage of Wind Energy
[SAND-79-0001] N79-26528
ENERGY TECHNOLOGY
National gas survey: Synthesized gaseous hydrocarbon fuels
[DOE/FERC-0008] N79-26228
Executive energy documents
[GPO-24-112] N79-26507
A pilot study of the potential for Navy utilization of solid waste derived fuels to offset fossil fuels consumption
[AD-A067165] N79-26510
System study on the feasibility of a coal-fired total-energy plant [with solar options] for Sandia Laboratories
[SAND-78-0979] N79-26530
Analysis of helio-thermoelectrical energy conversion efficiency
[REPT-77/HP-40-241] N79-26534
Fusion power program
[ANL/FPP-78-2] N79-26953
Enthalpy measurements for coal-derived liquids
N79-26997
Inventory of data bases, graphics packages, and models in Department of Energy laboratories
[ORNL-EIS-144] N79-27018
SEMTAP: A new technology transfer network to link business and industry with Federal research and development --- energy technology
[PB-292882/8] N79-27026
ENERGY TRANSFER
Effects of surface states on the low frequency transfer inefficiency in CCD's
N79-26302
Laser assisted semiconductor device processing --- energy transfer, thermal properties, and photon absorption
[AD-A067183] N79-26988
ENGINE CONTROL
Speed reducers-increasers
N79-26481
ENGINE PARTS
Feasibility study of automative Stirling engine heaters
[R77-719021] N79-26403
Handbook of data on selected engine components for solar thermal applications
[NASA-TM-79027] N79-26476
Brayton-cycle component characteristics
N79-26479
ENGINE TESTS
Evaluation of a simplified gross thrust calculation technique using two prototype F100 turbofan engines in an altitude facility
[NASA-TP-1482] N79-26057
Performance characteristics of automotive engines in the United States. Third series: Report no. 2, 1978 Pontiac, 301 CID [4.9 liters], 2V
[PB-293772/0] N79-26411
Low-power baseline test results for the GPU 3 Stirling engine
[NASA-TM-79103] N79-27023
ENGINES
Low-power baseline test results for the GPU 3 Stirling engine
[NASA-TM-79103] N79-27023
ENTHALPY
Enthalpy measurements for coal-derived liquids
N79-26997
ENTROPY
Second principle of thermodynamics, direction of heat flow and Fourier inequality: A comparative assessment
[OUEL-1255/78] N79-26369
Combustion noise prediction: Entropy/vorticity effects --- in gas turbines
[AD-A067993] N79-26882
ENVIRONMENT EFFECTS
Preliminary thoughts on proxy PNA
[CONF-781150-5] N79-26148
The role of environment, frequency and wave shape during fatigue crack growth in aluminum alloys
[VTH-LR-270] N79-26187
Compendium reports on oil shale technology
[PB-293279/6] N79-26237
A study of inflow characteristics in a stratified fluid
N79-26349
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
The MESA Puget Sound Project, Seattle, Washington
[PB-293906/4] N79-26560
An evaluation of the effects of geothermal energy development on aquatic biota in the geysers area of California
[PB-293031/1] N79-26562
Chemical technology and economics in environmental perspective. Task 1: Analysis of the sources of phosphorus in the environment
[PB-293376/0] N79-26568
Preliminary environmental assessment of the lignite-fired CAFB
[PB-293225/9] N79-26569
The relationship of the thermal regime of the soil to the extrinsic environment, with special reference to the north central United States
N79-26582
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7631-PR] N79-26910
Inventory of data bases, graphics packages, and models in Department of Energy laboratories
[ORNL-EIS-144] N79-27018
ENVIRONMENT MANAGEMENT
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
ENVIRONMENT MODELS
The development of mathematical models for the prediction of anthropogenic visibility impairment, volume 1
[PB-293119/4] N79-26613
ENVIRONMENT POLLUTION
Chemical technology and economics in environmental perspective. Task 1: Analysis of the sources of phosphorus in the environment
[PB-293376/0] N79-26568
ENVIRONMENT PROTECTION
CSIR annual report, 1978 --- research and development activities in the Republic of South Africa
[AR-34] N79-27061
ENVIRONMENT SIMULATORS
On the limits of applicability of the space-charge-limited P-dot driver
[AD-A066131] N79-26104
ENVIRONMENTAL CONTROL
Random vibration introduction: Environments, damaging effects, tests, test specifications and test economy
[ECR-84] N79-26435
Project STORMFURY: Experiments and outlook
[PB-294210/0] N79-26750
ENVIRONMENTAL SURVEYS
Third report of the TSCA Interagency Testing Committee to the administrator, Environmental Protection Agency
[PB-293378/6] N79-26465
Workshop on Ecological Impacts of Solar Energy Conversion
[COO-4339-4] N79-26522
Radiofrequency radiation levels and population exposure in urban areas of the eastern United States
[PB-292855/4] N79-26779
Analytical methodology and facility description spent fuel policy
[DOE/ET-0054] N79-26917
ENVIRONMENTAL TESTS
Icing tests of a UH-1H helicopter with an electrothermal ice protection system under simulated and natural icing conditions
[AD-A067737] N79-26050
The effect of environamental variables on the pitting corrosion behavior of single and duplex phase 304L stainless steel
N79-26157
ENZYMOLOGY
Photochemistry and enzymology of photosynthesis
[COO-3326-70] N79-26763
EPITAXY
Doping process in silicon epitaxy: Transfer function and physicochemical model
N79-26976
GaInAs and GaInAsP MBE crystal growth
[AD-A067164] N79-26985
Growth and homogeneity characterization of mercury cadmium telluride crystals
[AD-A067670] N79-26990
EPOXY COMPOUNDS
Fire protection covering for small diameter missiles
[NASA-CASE-ARC-11104-1] N79-26100
EPOXY RESINS
Determination of crosslinking in high T sub g polymers
[AD-A067185] N79-26211
Microwave curing of epoxy resins
[AD-A067732] N79-26214
EQUATIONS OF MOTION
The elastic-plastic dangling spider problem
N79-26835
Nonlinear waves as particles
N79-26880
EQUATORIAL ATMOSPHERE
Plasma instabilities in the equatorial F-region: Natural and artificial mechanisms
[AD-A068040] N79-26598
EQUILIBRIUM
Stabilization of the plutonium delta phase in the plutonium-gallium-zirconium ternary phase equilibria system
N79-26167
EQUIVALENT CIRCUITS
Design of rf power amplifiers [high and low Q] and lumped equivalent circuits of transmission lines with NMR applications
[IS-4596] N79-26329
EROSION
Proceedings of a Workshop on Coastal Sediment Transport Study
[PB-293632/6] N79-26757
ERROR ANALYSIS
Determination of the statistical properties of the digital sum of line codes to evaluate the relative average increase in error probability due to low frequency distortion in data transmission
[FUB-3-1978] N79-26281
Error rate estimation method based on the detection of line coding violations
[FUB-11-1978] N79-26286
Gyrocompassing error analysis for Pershing 2 inertial measurement unit
[AD-A067516] N79-26375
Inclusion of the orographic error in the numerical forecast model
N79-26671
A study of the effects of error of measurement on multiple regression analysis and a comparison of possible correction techniques
N79-26840
ERROR CORRECTING CODES
Real-time onboard geometric image correction
N79-26084
A digital scene matching technique for geometric image correction and autonomous navigation
N79-26085
A preliminary study of built-in-test for the Military Computer Family [MCF]
[AD-A067744] N79-26795
ERROR DETECTION CODES
Coding for the control of intersymbol interference in baseband channels
N79-26248
A preliminary study of built-in-test for the Military Computer Family [MCF]
[AD-A067744] N79-26795
ERROR FUNCTIONS
The least squares adjustment of errors in level surveys
[NPL-DNACS-9/78] N79-26862
ERROR SIGNALS
Coding for the control of intersymbol interference in baseband channels
N79-26248
ESTERS
Preparation of some prostaglandin E sub 1 omega-homo-prostaglandin E sub 1 esters and their inhibiting properties on rat blood platelet aggregation
N79-26765

ESTIMATING
Estimation for uncertain linear systems with jump parameters
N79-26874

ESTUARIES
FEDBAK03: A computer program for the modeling of first order consecutive reactions with feedback under a steady state multidimensional natural aquatic system. Program documentation and user's guide
[PB-292760/6] N79-26553

ETHANE
Liquid-vapor equilibrium measurement and prediction of the binary and ternary systems consisting of methane, ethane, and carbon dioxide at 270.00 K
N79-26130

ETHYL ALCOHOL
The production of ethanol from agricultural waste: An economic evaluation
[PB-292552/7] N79-26233

ETHYLENE
Investigation of test methods, material properties, and processes for solar cell encapsulants
[NASA-CR-158741] N79-26494

EUROPE
Proceedings of the Fifteenth International meeting on Alpine Meteorology, volume 1
[SZ-ISSN-0080-7346] N79-26623
Peculiar humidity-thermal conditions in a carpathian mountain valley in relation to different weather types
N79-26679

EUTECTIC ALLOYS
High-cycle fatigue behavior of a cobalt-based eutectic alloy
N79-26161
Oxygen partial pressure: A key to alloying and discovery in metal oxide-metal eutectic systems
[CONF-781172-1] N79-26182

EUTROPHICATION
A Lake Champlain trophic classification system
[PB-293427/1] N79-26462
Evaluation of aluminum sulfate for phosphorus control in eutrophic lakes
[PB-292989/1] N79-26556

EVALUATION
Structural design of flexible pavement. Part 3: Analysis of performance study data
[PB-292838/0] N79-26246
Flaw evaluation procedures --- inspecting nuclear power plant components
[EPRI-NP-719-SR] N79-26415

EVAPORATIVE COOLING
Examination of specific aspects of cooling tower testing methodology
[EPRI-FP-953] N79-26545

EXCIMER LASERS
Investigation of gain and absorption processes in the cadmium-mercury excimer
[AD-A066321] N79-26388

EXCITATION
Research on resonant charge-exchange X-ray and ultraviolet lasers
[AD-A067227] N79-26391
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898

EXHAUST GASES
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 427 cubic inch 1977 California GMC 6500
[PB-293530/2] N79-26410
Automotive fuel economy and emissions experimental data
[PB-293580/7] N79-26412
Commuter exposure modeling methodologies --- to air pollution
[PB-292995/8] N79-26557
Chemical composition of exhaust particles from gas turbine engines
[PB-292380/3] N79-26563
Predictions of highway emissions by a second order closure model
[PB-292703/6] N79-26566
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 361 cubic inch 1966 Ford F-600
[PB-293529/4] N79-26567

EXHAUST NOZZLES
Computer program for calculation of separated turbulent flows on axisymmetric afterbodies including exhaust plume effects
[AD-A066925] N79-26363
An experimental heat transfer study of the straight portion of the exhaust port of a spark ignition engine
N79-26400

EXHAUST SYSTEMS
Comparison between two calculation procedures for internal combustion engine exhaust systems
N79-26406

EXOBIOLOGY
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 194
[NASA-SP-7011[194]] N79-26770

EXPERIMENTAL DESIGN
Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067
The propagation of surface shear waves. Volume 2: Experiments
N79-26278
Subjective speaker recognition: Statistical consideration on attainable results significance
[FUB-17-1978] N79-26287
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
The intertropical convergence zone experiment: Background and summary
N79-26716

EXPLOSIVES
The characterization of a slurry explosive: Teledet
[AD-A066942] N79-26223
Fabrication of manganin stress gauges for use in detonating high explosives
[UCRL-81371] N79-26377

EXPOSURE
Radiofrequency radiation levels and population exposure in urban areas of the eastern United States
[PB-292855/4] N79-26779

EXTRAPOLATION
Extrapolation of induced transient surface currents on a scatterer to general band limited excitation conditions
[AD-A067672] N79-26265

EXTRATERRESTRIAL RADIATION
Cosmic rays, volume 1. A bibliography with abstracts
[NTIS/PS-79/0386/7] N79-27059
Cosmic rays, volume 2. A bibliography with abstracts
[NTIS/PS-79/0387/5] N79-27060

F

F REGION
Destruction of cyclotron resonances in weakly collisional, inhomogeneous plasmas
[AD-A067827] N79-26596
Plasma instabilities in the equatorial F-region: Natural and artificial mechanisms
[AD-A068040] N79-26598

FABRICATION
Gallium arsenide metal semiconductor field effect transistor fabrication based upon the processing of an individual die
N79-26298
Array automated assembly task for the low cost solar array project, phase 2
[NASA-CR-158727] N79-26489
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158740] N79-26490

FABRICS
The tearing of weathered rubber-coated fabrics
[RAE-TR-78005] N79-26218

FABRY-PEROT INTERFEROMETERS
Characterization of a Fabry-Perot interferometer and a dc arc plasma jet for spectrochemical analysis
[IS-T-815] N79-26144

FACTOR ANALYSIS
The relationship of the thermal regime of the soil to the extrinsic environment, with special reference to the north central United States
N79-26582

FACTORIAL DESIGN
On fractional replication of symmetrical factorial designs where the number of levels is not necessarily a prime or power of a prime
N79-26866

FACTORIALS
On fractional replication of symmetrical factorial designs where the number of levels is not necessarily a prime or power of a prime
N79-26866

FAILURE ANALYSIS
Prelidding burn-in evaluation
[AD-A067224] N79-26318
Fault simulation, analysis and diagnosis of a microprocessor
N79-26790

FAIRINGS
Optimum tail fairings for bodies of revolution --- computerized design
[AD-A067927] N79-26031

FAR FIELDS
Propagation of noise in the far field from electric transformers
N79-26293

FAR INFRARED RADIATION
Airborne infrared and submillimeter astronomical polarization measurements at different wavelengths --- C-141 observations
[NASA-CR-158751] N79-27044

FARADAY EFFECT
Rocket radio measurement of electron density in the nighttime ionosphere
[NASA-CR-157442] N79-26587

FARM CROPS
Characterizing thermal conditions in mountainous regions from the standpoint of requirements for cultivated plant growth
N79-26652

FAST NEUTRONS
Pulsed neutron measurement of single and two-phase liquid flow
[CONF-781113-31] N79-26896

FAST NUCLEAR REACTORS
Evolution of the properties and structure of 17Cr-13Ni-Mo very low carbon austenitic stainless steel during high temperature exposure --- fast nuclear reactors
N79-26188

FATIGUE (MATERIALS)
A literature review on fatigue and creep interaction
[NASA-CR-135305] N79-26429
Effects of notches on elevated-temperature, low-cycle fatigue behavior of type 204 stainless steel
[CONF-781202-25] N79-26434

FATIGUE LIFE
Evaluation of flawed composite structural components under static and cyclic loading --- fatigue life of graphite-epoxy composite materials
[NASA-CR-135403] N79-26120
Effects of truncation of a predominantly compression load spectrum on the life of a notched graphite/epoxy laminate
[NASA-TM-80114] N79-26427

FATIGUE TESTS
High-cycle fatigue behavior of a cobalt-based eutectic alloy
N79-26161

FATS
Influences of dietary fats on coronary flow rate and left ventricular work of the isolated rat heart
N79-26766
Effects of dietary fats on the coronary flow rate and the left ventricular function of the isolated rat heart
N79-26767

FATTY ACIDS
Effects of dietary fats on atherosclerosis and thrombosis
N79-26776

FEASIBILITY ANALYSIS
Numerical aerodynamic simulation facility feasibility study, executive summary
[NASA-CR-152284] N79-26071
Numerical aerodynamic simulation facility feasibility study
[NASA-CR-152285] N79-26072
Feasibility study of automative Stirling engine heaters
[R77-719021] N79-26403
Elements for technological and economic modeling of tower-type solar power plants
[P/51/76/17] N79-26535

FEDERAL BUDGETS
Energy: Fiscal year 1980 budget request
[GPO-42-886] N79-26508

FEEDBACK CONTROL
Optimal feedback controls for parameter identification
[AD-A067265] N79-26828
Linear state feedback, quadratic weights, and closed loop eigenstructures
[NASA-CR-158755] N79-26844

FEMALES
Air Force female pilots program: Initial performance and attitudes
[AD-A065641] N79-26783

FERMIONS
Symmetries and statistical behavior in fermion systems
[COO-2171-1E4] N79-26895

FERRITIC STAINLESS STEELS
Fe-Cr-Ni stainless steel corrosion in 40% KOH at 150 C and 180 C, part 2
[P/539/77/38] N79-26192

FERROELECTRICITY
Band and polarization calculations for ferro-electric and piezoelectric crystals
N79-26964

FIBER OPTICS
Report on collaboration activity between the 'Istituto Superiore Poste e Telecomunicazioni' and the Ugo Bordoni Foundation in 1977
N79-26275
Characterization of optical fibers and design criteria of communication systems
[FUB-14-1978] N79-26935
Radiation effects on optical fibers
[FUB-16-1978] N79-26936

FIELD EFFECT TRANSISTORS
Gallium arsenide metal semiconductor field effect transistor fabrication based upon the processing of an individual die
N79-26298

FIELD STRENGTH
Near-field radiation properties of simple linear antennas with applications to radiofrequency hazards and broadcasting
[PB-292647/5] N79-26290

FIELD THEORY [ALGEBRA]
Contact spaces for singularities over perfect fields
N79-26834
The prime discriminant factorization of discriminants of algebraic number fields
N79-26836
FIELD THEORY [PHYSICS]
The physics of braided-shield coaxial cable
N79-26251
Some non-perturbative results in relativistic field theory
N79-26995
FILAMENT WINDING
Stress relaxation in coiled ribbons of Fe40Ni40P14B6 and Fe29Ni49P14B6Si2
[AD-A068000] N79-26432
FILE MAINTENANCE [COMPUTERS]
A information retrieval system for research file data --- utilizing a computer program
[AD-A068021] N79-27017
FILLERS
Solidification behavior of type 308 stainless steel filler metal
[ORNL-TM-6644] N79-26179
FILTRATION
Fate of metal ions during domestic treatment of water containing organics
[PB-293147/5] N79-27034
FINANCE
FINCAP analysis: A method for financial capability analysis of Air Force contractors
[AD-A067998] N79-27006
FINITE DIFFERENCE THEORY
Prediction of flow and heat transfer in internally finned tubes
N79-26343
Finite-difference solutions for nonequilibrium laminar boundary layers in ionizing-argon flows
[UTIAS-226] N79-26360
Comparison between two calculation procedures for internal combustion engine exhaust systems
N79-26406
FINITE ELEMENT METHOD
A control-volume based finite element method for convective heat and mass transfer
N79-26354
An attempted extension of a finite element solution to axisymmetric potential flow --- galerkin method
[WSRL-0056-TR] N79-26359
APES-finite element fracture mechanics analysis revised documentation
[AD-A066246] N79-26430
Identification of parameters in distributed systems using finite element method
N79-26842
On linear differential systems having separable exponential form solutions with application to the calculation of transition matrices
N79-26879
FINLAND
Results from an attempt to interpolate temperature and wind profiles with respect to time with a one-dimensional boundary layer model
[TR-18] N79-26712
On the diurnal variation of visibility and fog in Finland
[TR-19] N79-26713
Activities of the Technical Research Center of Finland
N79-27062
FINNED BODIES
Prediction of flow and heat transfer in internally finned tubes
N79-26343
FIRE CONTROL
Research on an automated inertial azimuth measuring system
[AD-A067938] N79-26043
FIREPROOFING
Fire protection covering for small diameter missiles
[NASA-CASE-ARC-11104-1] N79-26100
FIRES
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL] --- Oregon
[E79-10220] N79-26447
FISSION PRODUCTS
Effect of fission product interactions on the corrosion and mechanical properties of HTGR alloys
[BNL-NUREG-25325] N79-26180
FLAME PROPAGATION
Studies on flame propagation in powdered mixtures
N79-26128
FLAME RETARDANTS
Flame retardation of polymers
N79-26205
FLASHING [VAPORIZING]
Optical transmission characterization of flash evaporated amorphous Se-Ge films
N79-26929
FLAT PLATES
Heat/mass transfer characteristics and fluid flow patterns for airflow about an inclined and yawed flat plate
N79-26011
FLEXIBILITY
Structural design of flexible pavement. Part 3: Analysis of performance study data
[PB-292838/0] N79-26246
FLIGHT MECHANICS
Flight Mechanics/Estimation Theory Symposium --- with application to autonomous navigation and attitude/orbit determination
[NASA-CP-2082] N79-26082
FLIGHT SIMULATION
Full-scale aircraft simulation with cryogenic tunnels and status of the National Transonic Facility
[NASA-TM-80085] N79-26064
FLIGHT SIMULATORS
Structuring of data systems: Psychophysiological data from the dynamic flight simulator
[AD-A067175] N79-27014
FLIGHT TESTS
High altitude altimeter flight test
[AD-A066904] N79-26054
FLIGHT TRAINING
Air Force female pilots program: Initial performance and attitudes
[AD-A065641] N79-26783
FLOOD CONTROL
Development of a drainage with flood control management system for urbanizing communities
N79-27022
FLOOD PREDICTIONS
Remote sensing program
[E79-10211] N79-26440
FLOODS
The prediction of geysering in fluid transfer lines by flooding theory
N79-26346
Interactive multiple objective optimization
[PB-293211/9] N79-26468
FLOW CHARTS
Factors affecting the usefulness of flow charts and other formats for computer programs
N79-26803
FLOW COEFFICIENTS
Study of second order turbulence models with variable coefficients
N79-26351
FLOW DISTRIBUTION
Investigation of a laser Doppler velocimeter system to measure the flow field around a large scale V/STOL aircraft in ground effect
[NASA-CR-152212] N79-26374
Some effects of vehicle flow field on the capture efficiency of a Gerdien capacitor atmospheric probe
[AD-A067710] N79-26594
Aerodynamic sound generation due to vortex-aerofoil interaction. Part 2: Analysis of the acoustic field
[NASA-CR-152231] N79-26883
FLOW MEASUREMENT
Feasibility study for a numerical aerodynamic simulation facility. Volume 2: Hardware specifications/descriptions
[NASA-CR-152288] N79-26069
Feasibility study for a numerical aerodynamic simulation facility. Volume 3: FMP language specification/user manual
[NASA-CR-152289] N79-26070
Pulsed neutron measurement of single and two-phase liquid flow
[CONF-781113-31] N79-26896
FLOW RESISTANCE
Resistive ballooning mode equation
[ORNL-TM-6629] N79-26954
FLOW VISUALIZATION
A simple method of adapting a wind tunnel Schlieren system for interferometry
[AD-A067233] N79-26073
FLUID FLOW
Heat/mass transfer characteristics and fluid flow patterns for airflow about an inclined and yawed flat plate
N79-26011
Spin axis tilt of satellite induced by the internal fluid migration
[NASDA-TR-8] N79-26103
A control-volume based finite element method for convective heat and mass transfer
N79-26354
FLUID MECHANICS
Fuel motion and pollutant formation in stratified charge combustion
[UCRL-81155] N79-26150
FLUID TRANSMISSION LINES
The prediction of geysering in fluid transfer lines by flooding theory
N79-26346
FLUIDICS
A fluid description of plasma double-layers
[NASA-CR-158719] N79-26942
FLUIDIZED BED PROCESSORS
Turbulent and fast fluidization [high velocity fluidization]
N79-26348
Preliminary environmental assessment of the lignite-fired CAFB
[PB-293225/9] N79-26569
FLUORESCENCE
Fluorescence measurements on a minidisc centrifugal analyzer with a pulsed nitrogen laser source
N79-26125
Accurate chemical characterization by fluorescence spectrometry
N79-26126
Energy levels and line intensities for the ground configuration of Pr3+ in LiYF4
[AD-A067845] N79-26140
FLUORIDES
An investigation of the atomic fluorine laser excited in a hollow cathode discharge
N79-26383
FLUORINE
Crossed molecular beam study of the reactions of oxygen and fluorine atoms
[AD-A067848] N79-26894
FLUX DENSITY
The effect of ground relief upon the extreme values of intensity and duration of precipitation in Belgium. Methods and results
N79-26697
FLYBY MISSIONS
An encounter with Halley's comet at 24 km per second
[TUM-LRT-TB-78/5] N79-27052
FLYWHEELS
Prototype development of an optimized, tapered-thickness, graphite/epoxy composite flywheel
[UCRL-52623] N79-26121
FOCI
Basic physical phenomena neutron production and scaling of the dense plasma focus
[IPF-77-7] N79-26961
FOG
On the diurnal variation of visibility and fog in Finland
[TR-19] N79-26713
FOILS [MATERIALS]
Beam foil spectroscopy of heavy ions at energies from 20 to 238 MeV
[BNL-24909] N79-26916
FOOD
The production of ethanol from agricultural waste: An economic evaluation
[PB-292552/7] N79-26233
FOREBODIES
Control of forebody three-dimensional flow separations
[NASA-TM-78593] N79-26014
FORECASTING
Draft SCAG-78 growth forecast policy
[PB-293245/7] N79-27032
FORESTS
Ten-Ecosystem Study [TES] site 9, Washington County, Missouri
[E79-10218] N79-26445
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL] --- Oregon
[E79-10220] N79-26447
Lake Champlain basin forestland as a source of non-point pollutants
[PB-293434/7] N79-26460
Microclimatic conditions in the mountain mixed forest at different cutting procedures
N79-26653
FORMALISM
A method for the formal description of signaling systems
[FUB-4-1978] N79-26282
FORMING TECHNIQUES
Silicon ingot casting, heat exchanger method multi-wire slicing, fixed abrasive slicing technique. Phase 3: Silicon sheet growth development for the large area sheet task of the low-cost solar array project
[NASA-CR-158734] N79-26981
FORTRAN
NEWSUMT: A FORTRAN program for inequality constrained function minimization, users guide
[NASA-CR-159070] N79-26811
FOSSIL FUELS
A pilot study of the potential for Navy utilization of solid waste derived fuels to offset fossil fuels consumption
[AD-A067165] N79-26510
FOURIER LAW
Second principle of thermodynamics, direction of heat flow and Fourier inequality: A comparative assessment
[OUEL-1255/78] N79-26369
FOURIER SERIES
Spectral presentation of errors of numerical weather forecast
N79-26669
FOURIER TRANSFORMATION
Angular addressing properties of volume Fourier transform holograms in iron-doped lithium niobate
N79-26371
Evaluation of the two-dimensional Fourier transform applied to acoustic image pattern measurements
[AD-A068017] N79-26888

FRACTURE MECHANICS
APES-finite element fracture mechanics analysis revised documentation
[AD-A066246] N79-26430
Evaluation of equivalent initial flaws for damage tolerance annalysis
[AD-A067566] N79-26431
Approximate method of elastic-plastic fracture analysis for nozzle corner cracks
[NUREG/CR-0472] N79-26433
Trends in reliability modeling technology for fault tolerant systems
[NASA-TM-80089] N79-26810
FRACTURE STRENGTH
The effects of microstructure and strength on the fracture toughness of ultra-high strength aluminum alloys
N79-26159
A study of the experimental implementation and the resulting characteristic behavior of the J-integral fracture toughness parameter applied to two controlled-rolled steels
N79-26170
Fracture toughness in titanium alloys
[AD-A067785] N79-26176
Critical experiments, measurements and analyses to establish a crack arrest methodology for nuclear pressure vessel steels
[PB-292777/0] N79-26198
FRAMES
Simple models for computing dynamic responses of complex frame structures
[PB-292798/6] N79-26243
FRANCE
Insolation duration, insolation quotient in France: 1951 - 1970
[MN-MONO-105] N79-26620
Cloudiness situation in the Alpine region under various weather conditions
N79-26662
Statistical analysis of precipitations in the French Alps
N79-26693
Situations causing late snowfall over the French Alps
N79-26703
FREE FLOW
Investigation of the free flow electrophoretic process. Volume 1: Executive summary
[NASA-CR-161241] N79-26132
Investigation of the free flow electrophoretic process. Volume 2: Technical analysis
[NASA-CR-161240] N79-26133
FREE RADICALS
Low energy ion-molecule reaction dynamics and chemiionization kinetics
[COO-4694-1] N79-26897
FRESNEL LENSES
Fresnel zone lens fabricated by electron beam lithography in thin film waveguide
N79-26305
FRONTS [METEOROLOGY]
Time-height sections of a frontal system over the Alps
N79-26630
Modifications of the surface frontogenesis, associated with simple orography in an isentropic model
N79-26666
A case study of frontal developments in the Alps region
N79-26675
The precipitation in the period from 6-10 October 1977 over the Central Liguria
N79-26694
FUEL CELLS
Recent advances in redox flow cell storage systems
[NASA-TM-79186] N79-26505
FUEL CONSUMPTION
Fuel contaminants, volume 4: Application of oil agglomeration to coal wastes
[PB-293210/1] N79-26236
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 427 cubic inch 1977 California GMC 6500
[PB-293530/2] N79-26410
Performance characteristics of automotive engines in the United States. Third series: Report no. 2, 1978 Pontiac, 301 CID [4.9 liters], 2V
[PB-293772/0] N79-26411
Automotive fuel economy and emissions experimental data
[PB-293580/7] N79-26412
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 361 cubic inch 1966 Ford F-600
[PB-293529/4] N79-26567
FUEL SYSTEMS
Pulverised fuel non-return flap valve
[TDB-317] N79-26408
FUEL VALVES
Pulverised fuel non-return flap valve
[TDB-317] N79-26408
FUELS
Thermogravimetric analysis of solid refuse-derived fuels and coal
[AD-A067829] N79-26225
Fuel contaminants. Volume 3: Control of coal-related pollutants
[PB-293328/1] N79-26234
FUNCTION SPACE
Contribution to the theory of [N,M]-compact, paracompact and normal spaces
N79-26878
FUNCTIONAL ANALYSIS
Landesman-Lazar type problems for nonlinear equations
N79-26856
FUNCTIONS [MATHEMATICS]
Functions of a particular class of singular matrices
[FUB-12-1977] N79-26858
FUSELAGES
Fuselage surface pressure measurements of a helicopter wind-tunnel model with a 3.15-meter diameter single rotor
[NASA-TM-80051] N79-26015
A study of smoke movement in an aircraft fuselage
[RAE-TM-EP-613] N79-26040
Three-dimensional boundary layers on bodies of revolution at incidence
N79-26350
FUSION REACTORS
Proposal to the United States Energy Research and Development Administration for continuation of fusion reactor technology studies
[COO-4636-1] N79-26511
Electric power from laser fusion: The HYLIFE concept
[UCRL-81259-REV-1] N79-26524
Doublet demonstration fusion power reactor study
[GA-A-14742] N79-26946
Fusion power program
[ANL/FPP-78-2] N79-26953
Numerical software support for the fusion energy program at Oak Ridge
[CONF-780763-1] N79-26955
Plasma neutron diagnostic techniques with good spatial and energy resolution
[UCRL-81120] N79-26956

G

GALACTIC CLUSTERS
Investigations of distant field stars and clusters in the galactic anticenter
N79-27040
GALERKIN METHOD
An attempted extension of a finite element solution to axisymmetric potential flow --- galerkin method
[WSRL-0056-TR] N79-26359
GALLIUM
The properties of indium gallium antimonide thin films deposited by multitarget rf sputtering
N79-26155
GALLIUM ALLOYS
Stabilization of the plutonium delta phase in the plutonium-gallium-zirconium ternary phase equilibria system
N79-26167
GALLIUM ANTIMONIDES
Crystal growth and electrical properties of sputtered indium gallium antimonide thin films
N79-26974
GALLIUM ARSENIDES
Gallium arsenide metal semiconductor field effect transistor fabrication based upon the processing of an individual die
N79-26298
GaInAs and GaInAsP MBE crystal growth
[AD-A067164] N79-26985
GAME THEORY
Multimodeling and multiparameter singular perturbation in control and game theory
N79-26873
GAMMA RAYS
Radiation effects on optical fibers
[FUB-16-1978] N79-26936
GARP ATLANTIC TROPICAL EXPERIMENT
Tropospheric radiative divergence during phase 3 of the GARP Atlantic Tropical Experiment [GATE]
[PB-292761/4] N79-26609
Diagnostic analyses of the GATE A/B scale area at individual time periods
[PB-292961/0] N79-26743
Diurnal variability in the GATE [GARP Atlantic Tropical Experiment] region
[PB-292998/2] N79-26751
GAS ANALYSIS
Chemical composition of exhaust particles from gas turbine engines
[PB-292380/3] N79-26563
Oxidant formulation in the generation of ozone
[PB-293269/7] N79-26571
Hydrocarbons in Houston air
[PB-293226/7] N79-26579
Non-urban hydrocarbon concentrations in ambient air north of Houston, Texas
[PB-293227/5] N79-26580
Proceedings: Advances in Particles Sampling and Measurement
[PB-293363/8] N79-26581
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment
N79-26722
Intertropical convergence zone ozone profiles from the Learjet ozone analyzer
N79-26723
GAS CHROMATOGRAPHY
Thermodynamic studies of ternary mixtures by gas-liquid chromatography
N79-26124
Measurement of PCB emissions from combustion sources
[PB-293360/4] N79-26154
GAS COMPOSITION
Jet simulation techniques: Simulation of temperature effects by altering gas composition
[AD-A067084] N79-26362
GAS COOLED FAST REACTORS
Effect of fission product interactions on the corrosion and mechanical properties of HTGR alloys
[BNL-NUREG-25325] N79-26180
GAS COOLED REACTORS
Nuclear closed-cycle gas turbine [GT-HTGR]: A utility power plant for the year 2000
[GA-A-15184] N79-26515
GAS FLOW
Sandia laboratory combustion simulation facility --- for analyzing the flow of high temperature combustion products
[SAND-78-2240] N79-26146
GAS RECOVERY
Recovery, processing, and utilization of gas from sanitary landfills
[PB-293165/7] N79-26235
GAS SPECTROSCOPY
Investigation of infrared spectra of atmospheric gases to support stratospheric spectroscopic investigations
[NASA-CR-158716] N79-26586
GAS TURBINE ENGINES
Brayton-cycle component characteristics
N79-26479
Chemical composition of exhaust particles from gas turbine engines
[PB-292380/3] N79-26563
GAS TURBINES
Ceramic gas turbine engine demonstration program
[AD-A067970] N79-26059
Fuel hydrogen content as an indicator of radiative heat transfer in an aircraft gas turbine combustor
[AD-A067709] N79-26224
Nuclear closed-cycle gas turbine [GT-HTGR]: A utility power plant for the year 2000
[GA-A-15184] N79-26515
Combustion noise prediction: Entropy/vorticity effects --- in gas turbines
[AD-A067993] N79-26882
GAS-METAL INTERACTIONS
The kinetics of the oxidation of graphite by an impinging jet of gas
[NRC/CNR-TT-1938] N79-26172
GAS-SOLID INTERFACES
Computational study of chemical reaction dynamics at the gas-solid interface
[AD-A067854] N79-26392
GASEOUS FUELS
National gas survey: Synthesized gaseous hydrocarbon fuels
[DOE/FERC-0008] N79-26228
GASIFICATION
A pore model for gasification reactions: An application to the system C-CO2-CO-N2
N79-26127
GAUGE INVARIANCE
Weak interactions at high energies --- broken gauge theory and elementary particle interactions
[SLAC-PUB-2177] N79-26914
GAUSS EQUATION
The development of mathematical models for the prediction of anthropogenic visibility impairment, volume I
[PB-293119/4] N79-26613
GEARS
Speed reducers-increasers
N79-26481
GENERAL AVIATION AIRCRAFT
A consideration of general aviation in the UK
[TT-7902] N79-26010
GENETIC CODE
Results of a 64Cu-loading test applied to patients with an inherited defect in their Cu-metabolism [Menkes' disease]
[IRI-133-77-04] N79-26774
GEODESY
Measurements methods applied to satellite geodesy: Basic Theory
[TUM-MITT-145] N79-26105

GEODETIC SATELLITES
Measurements methods applied to satellite geodesy: Basic Theory
[TUM-MITT-145] N79-26105
GEOLOGICAL FAULTS
Relief of the Ocean floor and the new global tectonics
N79-27067
GEOLOGY
Regional geologic analysis of the Black Hills of South Dakota and Wyoming from remote sensing data
N79-26437
GEOMAGNETIC LATITUDE
Expected muon spectra at two different latitudes
[KGI-77-2] N79-27058
GEOMORPHOLOGY
Relief of the Ocean floor and the new global tectonics
N79-27067
GEOPHYSICAL OBSERVATORIES
Thule Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-131-6] N79-26601
Thule Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-132-4] N79-26602
Thule Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-133-2] N79-26603
Godhavn Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-128-6] N79-26604
Godhavn Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-129-4] N79-26605
Godhavn Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-130-8] N79-26606
Rude Skov Geophysical Observatory: Magnetic results, 1975
[ISBN-87-7478-149-9] N79-26607
Rude Skov Geophysical Observatory: Magnetic results, 1976
[ISBN-87-7478-150-2] N79-26608
GEOPHYSICS
High pressure science and technology in Japan --- biochemical and geophysical reactions, superhard materials, and other research
[ONRT-M1] N79-26361
Solar-geophysical data number 414 [supplement], February 1979. Part 1: Prompt Reports. Data for December 1978 - January 1979
[PB-294770/3] N79-27054
Solar-geophysical data number 414 [supplement], February 1979. Part 2: Comprehensive reports. Data for August - July 1978 and miscellanea
[PB-294771/1] N79-27055
Solar-geophysical data number 414 [supplement], February 1979: Explanation of data reports
[PB-294772/9] N79-27056
Translations on USSR science and technology: Physical sciences and technology, no. 72
[JPRS-73663] N79-27064
GEOSYNCHRONOUS ORBITS
Modeling of the geosynchronous orbit plasma environment. Part 3: ATS-5 and ATS-6 pictorial data atlas
[AD-A067843] N79-26597
GEOTHERMAL ENERGY CONVERSION
Geothermal heating with heat pumps
N79-26531
GEOTHERMAL RESOURCES
An evaluation of the effects of geothermal energy development on aquatic biota in the geysers area of California
[PB-293031/1] N79-26562
A micrometeorological network for study of transport and diffusion of pollutants in two Apennine Valleys
N79-26638
GERMANIUM ALLOYS
Optical transmission characterization of flash evaporated amorphous Se-Ge films
N79-26929
GIMBALS
Effect of several geometric parameters on the static internal performance of three nonaxisymmetric nozzle concepts
[NASA-TP-1468] N79-26022
GLACIERS
Quantitative evaluation of the short-wave radiation balance of a glacier
N79-26689
Investigation of water table on the Kesselwandferner [Oetztal Alps] in a 30 m deep firn pit, a synopsis
N79-26690
GLACIOLOGY
Paleoclimate of the Nendaz region. New interpretation of the post-wurmian warming
N79-26657
GLASS
Light scattering from phase separated glass
N79-26207
Evaluation of the effects of solar radiation on glass --- space environment simulation
[NASA-CR-161247] N79-26209
Development of a glass polymer composite sewer pipe from waste glass
[BNL-50886] N79-26215
The effect of weathering on the modulus of rupture of VHR2A and VHR3A glass [Glaverbel-Mecaniver SA]
[DR-MAT-210] N79-26216
Stress relaxation in coiled ribboms of Fe40Ni40P14B6 and Fe29Ni49P14B6Si2
[AD-A068000] N79-26432
Storage and disposal of radioactive waste as glass in canisters
[PNL-2764] N79-26911
GLOBAL POSITIONING SYSTEM
Accurate determination of ionospheric effects on satellite based positioning systems using a versatile three-dimensional ray tracing program
[UIO-SR-78-04] N79-26267
GLOW DISCHARGES
A study of an electrodeless glow discharge as a means of modifying the surface of polymers
[PB-293570/8] N79-26220
GOES SATELLITES
LFM 24-hour prediction of eastern Pacific cyclones refined by satellite images
[PB-294324/9] N79-26744
GOLD
Structure of 001 grain boundaries in bicrystalline thin films of gold
N79-26166
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach
N79-26169
Materials problems with inertial confinement fusion targets --- gold and tungsten coatings
[LA-UR-79-76] N79-26945
GOVERNMENTS
Earth information from space by remote sensing
[PB-292736/6] N79-26454
Information technology and governmental reorganization: Summary of the Federal Data Processing Reorganization Project
[PB-294543/4] N79-26800
GRADIENTS
Conjugate gradient type methods for unsymmetric and inconsistent systems of linear equations
[CTH-78.03-R] N79-26861
GRAIN BOUNDARIES
Structure of 001 grain boundaries in bicrystalline thin films of gold
N79-26166
The effect of grain structure on the stress corrosion resistance of Al-Zn-Mg-Cu alloys
[RAE-TR-78034] N79-26193
Quantitative analysis of defects in silicon: Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158724] N79-26980
GRAPHITE
Raman studies of the orientational motions of small diatomics dissolved in argon, 1; and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite, 2
N79-26122
A pore model for gasification reactions: An application to the system C-CO2-CO-N2
N79-26127
The kinetics of the oxidation of graphite by an impinging jet of gas
[NRC/CNR-TT-1938] N79-26172
GRAPHITE-EPOXY COMPOSITE MATERIALS
Evaluation of flawed composite structural components under static and cyclic loading --- fatigue life of graphite-epoxy composite materials
[NASA-CR-135403] N79-26120
Prototype development of an optimized, tapered-thickness, graphite/epoxy composite flywheel
[UCRL-52623] N79-26121
Investigations into the mechanical behavior of composite bolted joints
[NASA-CR-158752] N79-26402
Effects of truncation of a predominantly compression load spectrum on the life of a notched graphite/epoxy laminate
[NASA-TM-80114] N79-26427
GRASSLANDS
Ten-Ecosystem Study [TES] site 9, Washington County, Missouri
[E79-10218] N79-26445
GRAVITATION
Investigation of the free flow electrophoretic process. Volume 1: Executive summary
[NASA-CR-161241] N79-26132
Investigation of the free flow electrophoretic process. Volume 2: Technical analysis
[NASA-CR-161240] N79-26133
GRAVITATIONAL FIELDS
Gravitational time delay in orthogonally polarized radiation passing by the sun
[NASA-CR-158757] N79-27049
GRAVITATIONAL WAVES
Averaging filter for analog processing of gravitational signals
[LPS-78-10] N79-26280
Low-noise preamplifier for gravitational wave experiments
[LPS-78-11] N79-26339
Gravity wave propagation in the presence of a current with an arbitrary vertical profile
[PB-293806/6] N79-26758
GRAZING INCIDENCE
Angular effects in the sputtering of stainless steel by hydrogen ions
[GA-A-15124] N79-26185
GREECE
The mountain mass of Olympus as a heating source of the lower troposphere
N79-26688
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation
N79-26698
GREEN FUNCTION
Some applications of Green's functions to the study of the effects of surfaces on the dynamical properties of elastic solids
N79-26973
GREENLAND
Thule Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-132-4] N79-26602
Thule Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-133-2] N79-26603
Godhavn Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-128-6] N79-26604
Godhavn Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-129-4] N79-26605
Godhavn Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-130-8] N79-26606
Rude Skov Geophysical Observatory: Magnetic results, 1975
[ISBN-87-7478-149-9] N79-26607
GRINDING [COMMINUTION]
Slotting by electrochemical grinding
[BDX-613-1908-REV] N79-26405
GROUND EFFECT [AERODYNAMICS]
Thrust and mass flow characteristics of four 36 inch diameter tip turbine fan thrust vectoring systems in and out of ground effect
[NASA-CR-152239] N79-26056
Investigation of a laser Doppler velocimeter system to measure the flow field around a large scale V/STOL aircraft in ground effect
[NASA-CR-152212] N79-26374
GROUND EFFECT MACHINES
Air cushion landing gear applications study
[NASA-CR-159002] N79-26045
GROUND TESTS
Ground-based measurements of the wake vortex characteristics of a B-747 aircraft in various configurations
[NASA-TM-80474] N79-26016
GROUND TRUTH
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978 --- Colby, Kansas and Yuma, Colorado
[E79-10215] N79-26442
GROUND WATER
Water resources data for Indiana, water year 1977
[PB-292256/5] N79-26450
Improvement of the steady floating random walk Monte Carlo method near straight line and circular boundaries with application to groundwater flow
[PB-292560/0] N79-26453
GUIDANCE SENSORS
Navigation and attitude reference for autonomous satellite launch and orbital operations
N79-26089
GULF OF MEXICO
Analysis of researchable water problems in the south Atlantic gulf region
[PB-293484/2] N79-26458
Data from the Atlantic Oceanographic and Meteorological Laboratories OTEC plant site study in the Gulf of Mexico, July 1977
[PB-293733/2] N79-26759
GUST ALLEVIATORS
A wind-tunnel investigation of tilt-rotor gust alleviation systems
[NASA-CR-152264] N79-26062
GYROCOMPASSES
Gyrocompassing error analysis for Pershing 2 inertial measurement unit
[AD-A067516] N79-26375

H

HADRONS
Nonlinear waves as particles
N79-26880
Hadron production in high energy muon scattering
N79-26903
Hadron-nucleus inclusive data from Fermilab
[COO-3065-210] N79-26912

HAIL
Climatology of thunderstorms and hail in Austria
N79-26706
A poster: Meteorological experiments in the framework of the 4th large-scale hail suppression test in Switzerland
N79-26707

HALL EFFECT
Studies of high-dose ion implantation in silicon --- differential resistivity, Hall effect, and spectroscopic analysis
N79-26975

HARDENING [MATERIALS]
High pressure science and technology in Japan --- biochemical and geophysical reactions, superhard materials, and other research
[ONRT-M1] N79-26361

HARDWARE
Feasibility study for a numerical aerodynamic simulation facility. Volume 2: Hardware specifications/descriptions
[NASA-CR-152288] N79-26069

HARMONIC GENERATIONS
Harmonic generation and parametric excitation in a beam-plasma system
N79-26938

HARMONIC OSCILLATION
Realistic interactions and variational calculations of the ground state properties of three body systems on a harmonic oscillator basis
[ISS-P-78/10] N79-26900

HASTELLOY [TRADEMARK]
High temperature deformation of solid solution strengthened superalloys --- nickel-base Hastelloy alloy C-276 and cobalt-base Haynes alloy No. 188
N79-26165

HAZARDS
Feasibility of non-catapult ejection and hazard of an ejection seat rocket plume
[AD-A067080] N79-26036

HEALTH
Telehealth handbook: A guide to telecommunications technology for rural health care
[PB-292557/6] N79-26778

HEAT CAPACITY MAPPING MISSION
HCMM Heat Capacity Mapping Mission
[E79-10214] N79-26441

HEAT PUMPS
HYCSOS chemical heat pump and energy conversion system
[CONF-781142-7] N79-26529
Geothermal heating with heat pumps
N79-26531

HEAT RESISTANT ALLOYS
Thermal fatigue of oxidation resistant overlay coatings for superalloys
N79-26156
High temperature deformation of solid solution strengthened superalloys --- nickel-base Hastelloy alloy C-276 and cobalt-base Haynes alloy No. 188
N79-26165

HEAT SOURCES
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7651-PR] N79-26910

HEAT STORAGE
Heat and mass flow analysis of packed-bed thermal regenerators
[CAES-9] N79-26523

HEAT TRANSFER
Steady state and stability characteristics of catalytic arrays
N79-26129
Prediction of flow and heat transfer in internally finned tubes
N79-26343
Local and average heat transfer characteristics for turbulent air flow in an asymmetrically heated tube
N79-26357
Experime ts heat transfer and pressure drop for an array of coli ar interrupted plates
N79-26358
An experimental heat transfer study of the straight portion of the exhaust port of a spark ignition engine
N79-26400

HEAT TRANSFER COEFFICIENTS
Heat/mass transfer characteristics and fluid flow patterns for airflow about an inclined and yawed flat plate
N79-26011
Performance and heat transfer of high energy rocket engines with thrust variation
[ILR-21] N79-26111
Heat transfer mediums
[P-52/D-08/77-10] N79-26367
Stability calculations for MHD magnets
[CONF-781055-4] N79-26960

HEAT TRANSMISSION
Unsteady turbulent thermal convection
N79-26344
Second principle of thermodynamics, direction of heat flow and Fourier inequality: A comparative assessment
[OUEL-1255/78] N79-26369
Heat and mass flow analysis of packed-bed thermal regenerators
[CAES-9] N79-26523

HEATING
Microwave curing of epoxy resins
[AD-A067732] N79-26214

HEATING EQUIPMENT
Feasibility study of automative Stirling engine heaters
[R77-719021] N79-26403
Geothermal heating with heat pumps
N79-26531

HEAVY IONS
Beam foil spectroscopy of heavy ions at energies from 20 to 238 MeV
[BNL-24909] N79-26916

HEAVY NUCLEI
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898

HELICOPTERS
Fuselage surface pressure measurements of a helicopter wind-tunnel model with a 3.15-meter diameter single rotor
[NASA-TM-80051] N79-26015
A method of computing the pressure distribution on a single-bladed hovering helicopter rotor
N79-26044
Helicopter Icing Symposium
[AD-A067981] N79-26048
Icing tests of a UH-1H helicopter with an electrothermal ice protection system under simulated and natural icing conditions
[AD-A067737] N79-26050
Effect of helicopter noise on passenger annoyance
[NASA-TM-80106] N79-26782

HELIUM ISOTOPES
Gas bubble and damage microstructure in helium implanted nickel
[CONF-780851-4] N79-26178

HELMHOLTZ VORTICITY EQUATION
Capacitance matrix methods for the Helmholtz equation on general three-dimensional regions
[COO-3077-155] N79-26853

HERMITIAN POLYNOMIAL
Objective cross section analysis
N79-26674

HETEROGENEITY
Determination of crosslinking in high T sub g polymers
[AD-A067185] N79-26211

HEURISTIC METHODS
Sensitivity analysis for heuristic algorithms
N79-26805
A comparison of heuristic methods used in hierarchical production planning
[AD-A066932] N79-27004

HIERARCHIES
Analyses of reframing performance of multilevel synchronous time division multiplex hierarchy
N79-26247
A hierarchical model of portable input/output
N79-26808
A state space approach to hierarchical systems
N79-26872
A comparison of heuristic methods used in hierarchical production planning
[AD-A066932] N79-27004

HIGH ALTITUDE
Biological effects of high altitude climate and its therapeutic applications
N79-26650

HIGH ALTITUDE TESTS
High altitude altimeter flight test
[AD-A066904] N79-26054

HIGH ASPECT RATIO
Structural dynamics, stability and control of high aspect ratio wind turbine generators
N79-26471

HIGH ENERGY INTERACTIONS
Harmony in science: Superconductivity and high energy physics
[SLAC-PUB-2237] N79-26905
Weak interactions at high energies --- broken gauge theory and elementary particle interactions
[SLAC-PUB-2177] N79-26914

HIGH ENERGY PROPELLANTS
Performance and heat transfer of high energy rocket engines with thrust variation
[ILR-21] N79-26111

HIGH FREQUENCIES
MINIMUF-3.5 improved version of MINIMUF-3, a simplified HF MUF prediction algorithm
[AD-A066256] N79-26256
Note on non-destructive detection of voids by a high frequency inversion technique
[COO-2482-8] N79-26416

HIGH POWER LASERS
Plated copper substrates for the LASL Antares CO2 laser system --- mirror design
[LA-UR-79-9] N79-26397

HIGH PRESSURE
High pressure science and technology in Japan --- biochemical and geophysical reactions, superhard materials, and other research
[ONRT-M1] N79-26361

HIGH RESOLUTION
Laser fusion diagnostics
[UCRL-81099-REV-1] N79-26949

HIGH SPEED
Turbulent and fast fluidization [high velocity fluidization]
N79-26348

HIGH STRENGTH
The effect of weathering on the modulus of rupture of VHR2A and VHR3A glass [Glaverbel-Mecaniver SA]
[DR-MAT-210] N79-26216

HIGH STRENGTH ALLOYS
Stress corrosion cracking of high strength Al-Zn-Mg-Cu alloys: Matrix precipitation
[RAE-TR-78110] N79-26174

HIGH STRENGTH STEELS
Lower cost by substituting steel for titanium
[AD-A067997] N79-26177
The determination of the alloying constituents of high speed tool steels by X-ray emission spectroscopy
[NPL-CHEM-94] N79-26197
Heavy plate of quenched and tempered steel with 80kg/mm2 tensile strength
[PB-292929/7] N79-26199

HIGH TEMPERATURE
A literature review on fatigue and creep interaction
[NASA-CR-135305] N79-26429

HIGH TEMPERATURE GASES
Sandia laboratory combustion simulation facility --- for analyzing the flow of high temperature combustion products
[SAND-78-2240] N79-26146

HIGH TEMPERATURE NUCLEAR REACTORS
Nuclear closed-cycle gas turbine [GT-HTGR]: A utility power plant for the year 2000
[GA-A-15184] N79-26515

HIGH TEMPERATURE RESEARCH
Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method --- temperature dependence
[NRC/CNR-TT-1942] N79-26173
Thermodynamic characterization of liquid metals at high temperature by isobaric expansion measurements --- platinum
[UCRL-80114] N79-27000
High temperature properties of nuclear reactor coolants and thermodynamic power cycle working Fluids --- in liquid metal fast breeder reactors
[COO-3027-37] N79-27001

HIGH TEMPERATURE TESTS
High temperature deformation of solid solution strengthened superalloys --- nickel-base Hastelloy alloy C-276 and cobalt-base Haynes alloy No. 188
N79-26165

HIGHWAYS
Performance study of continuously reinforced concrete pavement on I-95
[PB-292930/5] N79-26241
Commuter exposure modeling methodologies --- to air pollution
[PB-292995/8] N79-26557
Highway capacity, measures of effectiveness, and flow theory
[PB-292763/0] N79-27029

HILBERT SPACE
The least-squares estimation of latent trait variables by a Hilbert space approach
[AD-A067279] N79-26847

HISTORIES
A history of air pollution meteorology through 1969
[PB-293741/5] N79-26559

HOLLOW CATHODES
An investigation of the atomic fluorine laser excited in a hollow cathode discharge
N79-26383

HOLOGRAPHY
Angular addressing properties of volume Fourier transform holograms in iron-doped lithium niobate
N79-26371
Holographically improved windows
[AD-A067914] N79-26376

HOMOGENEITY
Growth and homogeneity characterization of mercury cadmium telluride crystals
[AD-A067670] N79-26990

HOT-WIRE ANEMOMETERS
The influence of compressor inlet guide vane/stator relative circumferential positioning on blade wake transport and interaction
[AD-A067969] N79-26060

HOUSTON [TX]
Non-urban hydrocarbon concentrations in ambient air north of Houston, Texas
[PB-293227/5] N79-26580

HOVERING
A method of computing the pressure distribution on a single-bladed hovering helicopter rotor
N79-26044
An evaluation of linear acoustic theory for a hovering rotor
[NASA-TM-80059] N79-26881
HUMAN FACTORS ENGINEERING
Technology advancement of the electrochemical CO2 concentrating process
[NASA-CR-152250] N79-26135
A photometric and legibility assessment of Aerospace Optics, Incorporated Vivisun 20/20 display
[AD-A067668] N79-26786
HUMAN PATHOLOGY
Results of a 64Cu-loading test applied to patients with an inherited defect in their Cu-metabolism [Menkes' disease]
[IRI-133-77-04] N79-26774
The oral 64Cu-loading test: Applications and problems
[IRI-133-78-02] N79-26775
HUMAN PERFORMANCE
Effects of noise frequency on performance and annoyance
[NASA-TM-80107] N79-26781
HUMAN REACTIONS
Physiological effects of a high soybean protein diet in man
N79-26777
HUMAN TOLERANCES
Effects of noise frequency on performance and annoyance
[NASA-TM-80107] N79-26781
Effect of helicopter noise on passenger annoyance
[NASA-TM-80106] N79-26782
HUMIDITY
Simultaneous measurements from three motor-gliders of temperature and humidity horizontal distribution in a cross-section of the Inn Valley east of Innsbruck under condition of mountain and valley winds circulation
N79-26677
Peculiar humidity-thermal conditions in a carpathian mountain valley in relation to different weather types
N79-26679
HURRICANES
Project STORMFURY: Experiments and outlook
[PB-294210/0] N79-26750
HYBRID CIRCUITS
Prelidding burn-in evaluation
[AD-A067224] N79-26318
HYBRID STRUCTURES
Combined photovoltaic and thermal hybrid collector systems
[COO-4577-3] N79-26525
HYDRAZINE ENGINES
Performance of low thrust attitude control engines. Part 1: Nozzle flow and performance prediction
[TUM-LRT-TB-77/5-PT-1] N79-26113
Performance of low thrust attitude control engines. Part 2: Hydrazine engines theoretical performance and transport properties of reaction products
[TUM-LRT-TB-77/6-PT-2] N79-26114
Performance of low thrust attitude control engines. Part 3: Power augmented hydrazine performance and thermodynamic properties of reaction products
[TUM-LRT-TB-77/7-PT-3] N79-26115
Performance of low thrust attitude control engines. Part 4: Correlation equation for experimental boundary layer losses
[TUM-LRT-TB-77/14-PT-4] N79-26116
HYDROCARBON COMBUSTION
Sandia laboratory combustion simulation facility --- for analyzing the flow of high temperature combustion products
[SAND-78-2240] N79-26146
HYDROCARBON FUEL PRODUCTION
National gas survey: Synthesized gaseous hydrocarbon fuels
[DOE/FERC-0008] N79-26228
HYDROCARBONS
Characterization of multialkylated polycyclic aromatic hydrocarbons in energy-related materials
[CONF-781039-9] N79-26147
Hydrocarbons in Houston air
[PB-293226/7] N79-26579
Non-urban hydrocarbon concentrations in ambient air north of Houston, Texas
[PB-293227/5] N79-26580
Enthalpy measurements for coal-derived liquids
N79-26997
HYDROCLIMATOLOGY
Probability of the mean sum of monthly precipitation in the Austrian Alps
N79-26691
Spatial and temporal fluctuations of precipitations within an intra-Alpine area as function of general atmospheric circulation [examples taken in Savoy]
N79-26692
The precipitation in the period from 6-10 October 1977 over the Central Liguria
N79-26694
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation
N79-26698
HYDRODYNAMICS
A numerical solution technique for three-dimensional multiparticle Stokes flows
N79-26345
Results of a joint USA/USSR hydrodynamic and transport modeling project
[PB-293516/1] N79-26467
The solution of two dimensional problems in astrophysics
N79-27047
HYDROGEN
Effect of vibrational excitation in reactions of OH with H2
[AD-A058571] N79-26134
Hydrogen compatibility of structural materials for energy storage and transmission
[SAND-79-8200] N79-26183
Hydrogen electrode and nickel boride alloys
[P/539/77/30] N79-26533
HYDROGEN FUELS
Fuel hydrogen content as an indicator of radiative heat transfer in an aircraft gas turbine combustor
[AD-A067709] N79-26224
Hydrogen storage devices for automobiles
[BNL-25263] N79-26518
HYDROGEN IONS
Angular effects in the sputtering of stainless steel by hydrogen ions
[GA-A-15124] N79-26185
HYDROGEN OXYGEN FUEL CELLS
The use of fuel cell ion exchange membranes in electrolytic cells
[P/539/77/23] N79-26532
HYDROGEN PLASMA
Atomic reaction rates in H[-] and D[-] plasmas
[UCID-18031] N79-26948
HYDROGEN PRODUCTION
Comparison of different techniques for producing hydrogen: Production costs analysis
[P/51/76/14] N79-26240
HYDROGEN-BASED ENERGY
Comparison of different techniques for producing hydrogen: Production costs analysis
[P/51/76/14] N79-26240
HYCSOS chemical heat pump and energy conversion system
[CONF-781142-7] N79-26529
HYDROLOGY
A stochastic model for an intermittent hydrologic process
N79-26438
Interactive multiple objective optimization
[PB-293211/9] N79-26468
Investigation of water table on the Kesselwandferner [Oetztal Alps] in a 30 m deep firn pit, a synopsis
N79-26690
HYDROMETEOROLOGY
Situations causing late snowfall over the French Alps
N79-26703
Design of distribution maps of precipitation, evaporation, and runoff in the Alps
N79-26708
HYDROXYL RADICALS
Effect of vibrational excitation in reactions of OH with H2
[AD-A058571] N79-26134
HYPERSONIC FLOW
Hypersonic flow past a slender elliptic cone
[AD-A068002] N79-26028
HYPOTHESES
Approximate tests of hypotheses in regression models with grouped data
[AD-A066926] N79-26845

I

ICE FORMATION
An operational research investigation of the ice-detection capability and utility of the surface condition analyzer [SCAN] system and its applicability to Navy-wide use
[AD-A067174] N79-26037
Helicopter Icing Symposium
[AD-A067981] N79-26048
The development of a microwave radiometer for use as a highway ice detector
[PB-292645/9] N79-26382
Recent and ice age climatic ecological arrangement of the African high mountains between the Mediterranean and the equator
N79-26656
Geographical distribution of ice formation in Liguria
N79-26701
Ice depositions in Rumanian mountainous regions
N79-26704
Numerical simulation of river icing, depending on meteorological parameters, using the Loisach in upper Bavaria as an example
N79-26709
IDENTIFYING
The determination of the alloying constituents of high speed tool steels by X-ray emission spectroscopy
[NPL-CHEM-94] N79-26197
IMAGE PROCESSING
Onboard image processing
N79-26083
Real-time onboard geometric image correction
N79-26084
A digital scene matching technique for geometric image correction and autonomous navigation
N79-26085
Orbit/attitude estimation with LANDSAT Landmark data
N79-26086
Autonomous attitude estimation via star sensing and pattern recognition
N79-26088
Improved camera-tube performance with pulsed operation
[AD-A067336] N79-26317
Evaluation of the two-dimensional Fourier transform applied to acoustic image pattern measurements
[AD-A068017] N79-26888
IMAGE RESOLUTION
Onboard image processing
N79-26083
Real-time onboard geometric image correction
N79-26084
A digital scene matching technique for geometric image correction and autonomous navigation
N79-26085
IMAGERY
The use of models in image analysis
[AD-A067166] N79-26448
IMAGING TECHNIQUES
Laser fusion diagnostics
[UCRL-81099-REV-1] N79-26949
A study of the acousto-optic effect in nematics as a means of acoustic field imaging
[AD-A067173] N79-26986
Proportional counter for X-ray analysis of lunar and planetary surfaces --- a position sensitive scintillating imaging proportional counter
[NASA-CR-158754] N79-27051
IMBEDDINGS [MATHEMATICS]
Capacitance matrix methods for the Helmholtz equation on general three-dimensional regions
[COO-3077-155] N79-26853
IMP
Shoe-box orbit determination system for SMM preliminary results
N79-26092
IMPACT TESTS
Dynamic analysis to establish normal shock and vibration of radioactive material shipping packages --- mechanical shock during rail transportation
[PB-293660/7] N79-26409
IMPEDANCE MEASUREMENTS
Simultaneous realization of input and transfer impedances in RC ladder networks
N79-26308
An impedance technique for determining low-frequency payload environments
[NASA-CR-3143] N79-26428
IMPULSES
Pulsed-laser-generated impulse on a surface in supersonic flow
[LOG-J-10741] N79-26012
Validity of the factorized DWIA in e, e1p reactions
[ISS-P-78/8] N79-26899
IMPURITIES
Upper critical magnetic field of superconducting films with magnetic impurities
N79-26962
Specific heat of superconducting films of indium and of indium alloyed with magnetic impurities
N79-26968
NMR of dilute ortho-H[sub]2 impurities in solid para-H[sub] 2 at temperatures below 1K
N79-26972
Semiconductor measurement technology: DISTRIB 1, an impurity redistribution computer program
[PB-293293/7] N79-26994
INCIDENCE
Angular addressing properties of volume Fourier transform holograms in iron-doped lithium niobate
N79-26371
INDEPENDENT VARIABLES
Optimal feedback controls for parameter identification
[AD-A067265] N79-26828
INDEXES [DOCUMENTATION]
A Lake Champlain trophic classification system
[PB-293427/1] N79-26462
International science indicators: Development of indicators of international scientific activity using the science citation index
[PB-293033/7] N79-27020
Data base available at the National Bureau of Standards Library
[PB-293170/7] N79-27021
INDIANA
Water resources data for Indiana, water year 1977
[PB-292256/5] N79-26450

INDIUM ALLOYS
Specific heat of superconducting films of indium and of indium alloyed with magnetic impurities
N79-26968

INDIUM ANTIMONIDES
The properties of indium gallium antimonide thin films deposited by multitarget rf sputtering
N79-26155
Crystal growth and electrical properties of sputtered indium gallium antimonide thin films
N79-26974

INDIUM PHOSPHIDES
GaInAs and GaInAsP MBE crystal growth
[AD-A067164] N79-26985

INDUSTRIAL WASTES
Proceedings: Third Workshop on catalytic combustion
[PB-293336/4] N79-26548

INERTIA
Inertial perturbations to inertialess magnetohydrodynamic and rotating flows
N79-26342

INERTIAL FUSION [REACTOR]
Materials problems with inertial confinement fusion targets --- gold and tungsten coatings
[LA-UR-79-76] N79-26945

INERTIAL NAVIGATION
On linear differential systems having separable exponential form solutions with application to the calculation of transition matrices
N79-26879

INERTIAL PLATFORMS
Gyrocompassing error analysis for Pershing 2 inertial measurement unit
[AD-A067516] N79-26375

INERTIAL UPPER STAGE
Inertial Upper Stage [IUS] software analysis
[NASA-CR-161251] N79-26107

INFLATABLE STRUCTURES
Development of an inflatable head/neck restraint system for ejection seats, update
[AD-A067124] N79-26038

INFORMATION FLOW
Information flow and analysis: Theory simulation, and examples. Part 1: Basic theoretical and conceptual development. Part 2: Simulation, examples and results
[PB-293458/6] N79-27007

INFORMATION RETRIEVAL
A information retrieval system for research file data --- utilizing a computer program
[AD-A068021] N79-27017

INFORMATION SYSTEMS
Navy laboratory interactive graphics study
[AD-A067402] N79-26816
Federal Information Centers Act
[S-REPT-95-1129] N79-27009
Data base available at the National Bureau of Standards Library
[PB-293170/7] N79-27021
Technology assessment and forecast report
[PB-293380/2] N79-27030

INFORMATION THEORY
Information flow and analysis: Theory simulation, and examples. Part 1: Basic theoretical and conceptual development. Part 2: Simulation, examples and results
[PB-293458/6] N79-27007

INFRARED ASTRONOMY
Airborne infrared and submillimeter astronomical polarization measurements at different wavelengths --- C-141 observations
[NASA-CR-158751] N79-27044

INFRARED IMAGERY
LFM 24-hour prediction of eastern Pacific cyclones refined by satellite images
[PB-294324/9] N79-26744
Atlas of infrared imagery of the sea surface
[AD-A067731] N79-26756

INFRARED SCANNERS
U-2 water vapor burden observations through the tropopause
N79-26726

INFRARED SPECTRA
Investigation of infrared spectra of atmospheric gases to support stratospheric spectroscopic investigations
[NASA-CR-158716] N79-26586

INFRARED SPECTROSCOPY
Preliminary results from the University of Denver infrared spectrometer - 1977 intertropical convergence zone experiment
N79-26724

INHIBITORS
Critical experiments, measurements and analyses to establish a crack arrest methodology for nuclear pressure vessel steels
[PB-292777/0] N79-26198

INJECTION
Improvements in high injection transistor noise theory and models
N79-26299
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919

INORGANIC COMPOUNDS
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
[LBL-8294] N79-26142
The NRL program on electroactive polymers
[AD-A067736] N79-26213
Inorganic nitrogen content of precipitation in the lower Alps
N79-26696

INPUT/OUTPUT ROUTINES
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-158723] N79-26497

INSECTS
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578

INSOLATION
Insolation duration, insolation quotient in France: 1951 - 1970
[MN-MONO-105] N79-26620
Quantitative evaluation of the short-wave radiation balance of a glacier
N79-26689

INSPECTION
Flaw evaluation procedures --- inspecting nuclear power plant components
[EPRI-NP-719-SR] N79-26415

INTEGRAL EQUATIONS
Boundary integral equation methods applied to wave problems
[AD-A067536] N79-26261

INTEGRATED CIRCUITS
Design and analysis of integrated electrothermal filters
N79-26295
Nonlinear system analysis in bipolar integrated circuits
N79-26296
Electrical characterization of Hughes HCMP 1853D and RCA CDP1853D N-bit, CMOS, 1-of-8 decoder microcircuits
[HAC-REF-E0963] N79-26315
Device technology for high performance monolithic sample-and-hold circuits
[AD-A067786] N79-26324
Radiation hardened CMOS/SOS code generator for space applications
[AD-A067980] N79-26327
Integrated millimeter waves generator
[LCR-489-315] N79-26336

INTEGRATED GLOBAL OCEAN STATION SYSTEMS
Climatology in French Polynesia
[MN-MONO-107] N79-26621

INTELLIGIBILITY
The use of rhymed polysyllabic words in studying aural intelligibility indoors
[FUB-30-1977] N79-26270
Video telephonic service: Study on the influence of microphone characteristics and band width on intelligibility and quality of audio signals
[FUB-36-1977] N79-26272

INTELSAT 4 SATELLITE
INTELSAT 4 in orbit liquid slosh tests and problems in the theoretical analysis of the data
N79-26091

INTERFACES
Ellipsometry as a tool to study the adsorption behavior of synthetic and biopolymers at the air-water interface
N79-26217
AN/UYA-7 interface for USAF HF aeronautical stations
[AD-A067148] N79-26259

INTERFACIAL TENSION
High temperature properties of nuclear reactor coolants and thermodynamic power cycle working Fluids --- in liquid metal fast breeder reactors
[COO-3027-37] N79-27001

INTERFERENCE
Advanced multidither coat studies
[AD-A068005] N79-26932

INTERFEROMETERS
A scannable beam-forming interferometer antenna array system
[NASA-CASE-GSC-12365-1] N79-26252

INTERFEROMETRY
A simple method of adapting a wind tunnel Schlieren system for interferometry
[AD-A067233] N79-26073

INTERMETALLICS
Evaluation of equivalent initial flaws for damage tolerance annalysis
[AD-A067566] N79-26431
A chemical theory for the thermodynamics of highly solvated liquid metal mixtures
N79-26996

INTERNAL COMBUSTION ENGINES
An experimental heat transfer study of the straight portion of the exhaust port of a spark ignition engine
N79-26400
Comparison between two calculation procedures for internal combustion engine exhaust systems
N79-26406
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 427 cubic inch 1977 California GMC 6500
[PB-293530/2] N79-26410
Performance characteristics of automotive engines in the United States. Third series: Report no. 2, 1978 Pontiac, 301 CID [4.9 liters], 2V
[PB-293772/0] N79-26411
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 361 cubic inch 1966 Ford F-600
[PB-293529/4] N79-26567

INTERNAL COMPRESSION INLETS
The influence of compressor inlet guide vane/stator relative circumferential positioning on blade wake transport and interaction
[AD-A067969] N79-26060

INTERPLANETARY MAGNETIC FIELDS
The dc magnetic field observations at the earth's bow shock
[LPS-78-5] N79-27050
Magnetic dips in the solar wind
[NASA-TM-80477] N79-27053

INTERPOLATION
Objective cross section analysis
N79-26674
Results from an attempt to interpolate temperature and wind profiles with respect to time with a one-dimensional boundary layer model
[TR-18] N79-26712

INTERROGATION
Uplink ATCRBS environment measurements along the Boston-Washington corridor. Volume 2: Interrogator characteristics
[AD-A067944] N79-26041
Extensible data bases
[AD-A067015] N79-27012

INTERSTELLAR MASERS
High angular resolution observations of the circumstellar OH masers surrounding supergiant stars
N79-27042

INTERTROPICAL CONVERGENT ZONES
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
The intertropical convergence zone experiment: Background and summary
N79-26716
Operational activities
N79-26717
Notes on the meteorology of the intertropical convergence zone during the July 1977 experiment
N79-26718
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment
N79-26719
Measurement of NO and O3 from aircraft: 1977 tropical convergence zone experiment
N79-26720
Trace constituent mixing ratios in the lower stratosphere during the 1977 intertropical convergence zone experiment
N79-26721
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment
N79-26722
Intertropical convergence zone ozone profiles from the Learjet ozone analyzer
N79-26723
Preliminary results from the University of Denver infrared spectrometer - 1977 intertropical convergence zone experiment
N79-26724
Stratospheric aerosols in the intertropical convergence zone, Panama Canal zone
N79-26725
U-2 water vapor burden observations through the tropopause
N79-26726
Airborne pressure and temperature measurements during the 1977 intertropical convergence zone experiment
N79-26727
Pressure and temperature measurements from the U-2 aircraft during the 1977 intertropical convergence experiment
N79-26728
Balloon-borne ECC ozonesonde data, appendix A
N79-26729

INVENTORIES
Ten-Ecosystem Study [TES] site 9, Washington County, Missouri
[E79-10218] N79-26445
Regional air pollution study, emission inventory summarization
[PB-293164/0] N79-26574
Inventory of data bases, graphics packages, and models in Department of Energy laboratories
[ORNL-EIS-144] N79-27018

INVERSIONS
Note on non-destructive detection of voids by a high frequency inversion technique
[COO-2482-8] N79-26416
INVERTERS
Vacuum arc switched inverters
N79-26304
ION ACOUSTIC WAVES
Harmonic generation and parametric excitation in a beam-plasma system
N79-26938
ION BEAMS
Growth and structure of ion beam sputtered thin films of gold and cadmium sulfide on silicon substrate
N79-26131
Beam foil spectroscopy of heavy ions at energies from 20 to 238 MeV
[BNL-24909] N79-26916
Physical processes in directed ion beam sputtering
[NASA-CR-159567] N79-26943
ION EXCHANGE MEMBRANE ELECTROLYTES
The use of fuel cell ion exchange membranes in electrolytic cells
[P/539/77/23] N79-26532
ION EXCHANGE RESINS
The use of fuel cell ion exchange membranes in electrolytic cells
[P/539/77/23] N79-26532
ION IMPLANTATION
Atomic and electrical profile studies of ion-implanted semiconductors
N79-26303
Studies of high-dose ion implantation in silicon --- differential resistivity, Hall effect, and spectroscopic analysis
N79-26975
ION PROPULSION
A microprocessor sequencer for the UK T5 ion thruster and power conditioner unit
[RAE-TR-78057] N79-26797
IONIC COLLISIONS
Low energy ion-molecule reaction dynamics and chemiionization kinetics
[COO-4694-1] N79-26897
IONIZATION
Low energy ion-molecule reaction dynamics and chemiionization kinetics
[COO-4694-1] N79-26897
IONIZED GASES
Finite-difference solutions for nonequilibrium laminar boundary layers in ionizing-argon flows
[UTIAS-226] N79-26360
IONIZING RADIATION
Transient radiation and dose-enhancement effects in transistors
[AD-A067629] N79-26313
IONOSPHERIC COMPOSITION
AE reaction rate data
[AD-A067941] N79-26593
IONOSPHERIC DISTURBANCES
Plasma instabilities in the equatorial F-region: Natural and artificial mechanisms
[AD-A068040] N79-26598
Some significant ionospheric disturbance events during September 1977
[UIO-SR-78-05] N79-26600
IONOSPHERIC ELECTRON DENSITY
Rocket radio measurement of electron density in the nighttime ionosphere
[NASA-CR-157442] N79-26587
Use of a single function subroutine for multi-region ionospheric profiles with a versatile three-dimensional ray tracing program
[UIO-SR-78-03] N79-26599
IONOSPHERIC PROPAGATION
WEDCOM 4: A FORTRAN code for the calculation of ELF, VLF, and LF propagation in a nuclear environment. Volume 3: Computational models
[AD-A066977] N79-26260
Some significant ionospheric disturbance events during September 1977
[UIO-SR-78-05] N79-26600
IRON
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach
N79-26169
Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method --- temperature dependence
[NRC/CNR-TT-1942] N79-26173
IRON ALLOYS
Diffusivity and solubility of nitrogen in multi-component liquid iron alloys containing alloying elements up to 50 wt% at 1600 C
N79-26162
The effect of manganese and nickel additions in the welding flux on the fusion zone of pearlitic ductile iron
N79-26164
Lattice parameters of iron-aluminum silicon alloys with the DO3 structure
[IS-T-831] N79-26992
IRRADIATION
Gas bubble and damage microstructure in helium implanted nickel
[CONF-780851-4] N79-26178
ISENTROPIC PROCESSES
Modifications of the surface frontogenesis, associated with simple orography in an isentropic model
N79-26666
ISLANDS
Lake Champlain islands report
[PB-293441/2] N79-26463
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation
N79-26698
ISOBARS [PRESSURE]
Thermodynamic characterization of liquid metals at high temperature by isobaric expansion measurements --- platinum
[UCRL-80114] N79-27000
ISOLATION
Vibration isolation measurements on a precision machine tool
[LA-UR-78-3252] N79-26404
ISOMERIZATION
Synthesis of silicon-nitrogen-phosphorus compounds including a new synthesis of phosphazenes
[AD-A067274] N79-26137
ISOTHERMS
Topography of the 0 deg isotherm in the northern Alps in winter time
N79-26680
ISOTOPE EFFECT
Development of practical MO techniques for prediction of the properties and behavior of materials --- oxazoles and imidazoles
[AD-A067068] N79-26892
ISOTOPE SEPARATION
Laser studies of reactions
[AD-A067855] N79-26393
ISOTOPES
Spatial and temporal variations of the isotopic composition of precipitations at the Alps periphery
N79-26695
ISOTOPIC LABELING
Thin-source concentration dependent diffusion --- using isotopic labeling for measuring the diffusion of calcium cations in sodium chloride
N79-26966
ISOTROPY
Concentrated force problems in transverse isotropy
N79-26420
ITALY
Italian noise legislation: Defects and insufficiencies of present situation
[FUB-18-1978] N79-26550
Intensity of the lee-cyclogenesis over Northern Italy
N79-26629
Outline of Apennine meteorology
N79-26655
South Foehn, north Foehn, and temperature peaks at Innsbruck and Bozen
N79-26678
The precipitation in the period from 6-10 October 1977 over the Central Liguria
N79-26694
Geographical distribution of ice formation in Liguria
N79-26701
ITERATION
An iterative interpolation technique using finite impulse response digital filters
[AD-A067511] N79-26322
ITERATIVE SOLUTION
An iterative solver for a mixed variable variational formulation of the [first] biharmonic problem
[CTH-78.02-R] N79-26860

J

JAPAN
High pressure science and technology in Japan --- biochemical and geophysical reactions, superhard materials, and other research
[ONRT-M1] N79-26361
JET ENGINE FUELS
Fuel hydrogen content as an indicator of radiative heat transfer in an aircraft gas turbine combustor
[AD-A067709] N79-26224
JET EXHAUST
Jet simulation techniques: Simulation of temperature effects by altering gas composition
[AD-A067084] N79-26362
JET FLOW
Fluid mechanics of horizontal and vertical laminar Newtonian jets
N79-26347
JET IMPINGEMENT
The kinetics of the oxidation of graphite by an impinging jet of gas
[NRC/CNR-TT-1938] N79-26172
JET STREAMS [METEOROLOGY]
The characteristics of the spray generated by the efflux of various aircraft propulsors impinging normally on water
[AD-A067742] N79-26049
JOINTS [JUNCTIONS]
Blending of hydrogen in natural gas distribution systems. Volume 3: Gas blends leakage tests of selected distribution system components
[CONS/2925-3] N79-26229
Investigations into the mechanical behavior of composite bolted joints
[NASA-CR-158752] N79-26402
JUPITER [PLANET]
Variability of Lyman-alpha emission from Jupiter
[NASA-CR-158756] N79-27045

K

KALMAN FILTERS
Multiple scene attitude estimator performance for LANDSAT-1
N79-26087
KANSAS
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978 --- Colby, Kansas and Yuma, Colorado
[E79-10215] N79-26442
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578
A summary of the regional tectonics and seismicity of eastern Kansas; summary of project activities and results to the end of the second year, or September 10, 1979
[PB-293661/5] N79-26610
KENTUCKY
A Kentucky energy resource utilization program
[PB-292949/5] N79-26538
KEPLER LAWS
A fast method for determining the mean orbital elements of an earth satellite
[REPT-3-78] N79-26099
KINETIC ENERGY
Study of second order turbulence models with variable coefficients
N79-26351
Neutron damage correlation experiments in semiconductor devices
[AD-A066886] N79-26987

L

LABORATORIES
Numerical software support for the fusion energy program at Oak Ridge
[CONF-780763-1] N79-26955
LABORATORY EQUIPMENT
The microprocessor and its application in a laboratory environment
[RAE-TM-IT-165] N79-26798
LAKE CHAMPLAIN BASIN [NY-VT]
Estimates of the annual loading of total phosphorus to Lake Champlain
[PB-293435/4] N79-26459
Lake Champlain basin forestland as a source of nonpoint pollutants
[PB-293434/7] N79-26460
Lands in transition: Lake Champlain shoreland changes, 1960 - 1990
[PB-293431/3] N79-26461
A Lake Champlain trophic classification system
[PB-293427/1] N79-26462
Lake Champlain islands report
[PB-293441/2] N79-26463
Suitability of input-output models for evaluating the impact of phosphorous loadings to Lake Champlain
[PB-293442/0] N79-26464
Erosion and sedimentation nonpoint pollution sources and controls, LaPlatte River watershed
[PB-293436/2] N79-26576
LAKE ONTARIO
Lake-effect storms of Lake Ontario
N79-26616
LAKES
Results of a joint USA/USSR hydrodynamic and transport modeling project
[PB-293516/1] N79-26467
Distribution of phytoplankton in Arkansas lakes
[PB-292742/4] N79-26768
LAMINAR BOUNDARY LAYER
Finite-difference solutions for nonequilibrium laminar boundary layers in ionizing-argon flows
[UTIAS-226] N79-26360
LAMINAR FLOW
Summary of past experience in natural laminar flow and experimental program for resilient leading edge
[NASA-CR-152276] N79-26024
Fluid mechanics of horizontal and vertical laminar Newtonian jets
N79-26347
LANCE MISSILE
The 12831D Lance missile no. 2486, round no. 325 DSL [18 January 1979]
[AD-A067675] N79-26734

LAND USE
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL] — Oregon
[E79-10220] N79-26447
Land and natural resources management: An analysis of selected Federal policies programs, and planning mechanisms. Report to the President's Interagency Task Force on Environmental Data and Monitoring Programs
[PB-292500/6] N79-26449
Lands in transition: Lake Champlain shoreland changes, 1960 - 1990
[PB-293431/3] N79-26461
Growth effects of major land use projects [wastewater facilities]. Volume 2: Summary, predictive equations and worksheets
[PB-293229/1] N79-26572
LANDFORMS
Wind characteristics over ridges
N79-26618
LANDING GEAR
Air cushion landing gear applications study
[NASA-CR-159002] N79-26045
LANDSAT 1
Multiple scene attitude estimator performance for LANDSAT-1
N79-26087
Regional geologic analysis of the Black Hills of South Dakota and Wyoming from remote sensing data
N79-26437
LANDSLIDES
Remote sensing program
[E79-10211] N79-26440
LANGUAGE PROGRAMMING
Algorithms needed in a natural language understanding system
[PB-293232/5] N79-26823
LARGE AREA CROP INVENTORY EXPERIMENT
A simulation study of Large Area Crop Inventory Experiment [LACIE] technology
[E79-10216] N79-26443
Briefing Materials for Plenary Presentations: The LACIE Symposium
[E79-10217] N79-26444
Large Area Crop Inventory Experiment [LACIE]. Signature extension in remote sensing
[E79-10219] N79-26446
LASER APPLICATIONS
Laser studies of reactions
[AD-A067855] N79-26393
Laser assisted semiconductor device processing — energy transfer, thermal properties, and photon absorption
[AD-A067183] N79-26988
LASER CAVITIES
Optical quality of tilted spherical mirror unstable resonators
[AD-A068015] N79-26394
LASER DOPPLER VELOCIMETERS
Investigation of a laser Doppler velocimeter system to measure the flow field around a large scale V/STOL aircraft in ground effect
[NASA-CR-152212] N79-26374
LASER FUSION
Electric power from laser fusion: The HYLIFE concept
[UCRL-81259-REV-1] N79-26524
Laser fusion diagnostics
[UCRL-81099-REV-1] N79-26949
Laser fusion: Status, future, and tritium control
[UCRL-81946] N79-26950
LASER MATERIALS
Investigation of gain and absorption processes in the cadmium-mercury excimer
[AD-A066321] N79-26388
LASER PLASMA INTERACTIONS
Stimulated Brillouin sidescatter and backscatter of carbon dioxide laser radiation from a laser altered arc plasma
N79-26937
LASER PUMPING
Large volume multiple path nuclear pumped laser
[NASA-CASE-LAR-12592-1] N79-26385
LASER TARGETS
Pulsed-laser-generated impulse on a surface in supersonic flow
[LOG-J-10741] N79-26012
Materials problems with inertial confinement fusion targets — gold and tungsten coatings
[LA-UR-79-76] N79-26945
LASER WELDING
Welding of copper silicon and zirconium II using the 1200 watt CO2 continuous laser
[UNI-1190] N79-26395
LASERS
An investigation of the atomic fluorine laser excited in a hollow cathode discharge
N79-26383
Design investigation of solar powered lasers for space applications
[NASA-CR-159554] N79-26384
Large volume multiple path nuclear pumped laser
[NASA-CASE-LAR-12592-1] N79-26385
Correction of phase distortion by nonlinear optical techniques
[AD-A066148] N79-26386
Free electron lasers and stimulated scattering from relativistic electron beams
[AD-A066177] N79-26387
Ultraviolet damage resistance of laser coatings
[LA-UR-78-2607] N79-26396
Equipment for a laser surface measuring system
[BDX-613-1848-REV] N79-26398
LATEX
Evaluation of surface properties in SPAR electrophoresis — laxtex coatings and particle motion
[NASA-CR-161248] N79-26136
LATTICE PARAMETERS
Lattice parameters of iron-aluminum silicon alloys with the DO3 structure
[IS-T-831] N79-26992
LAW [JURISPRUDENCE]
Institutional arrangements for effective water management in Colorado
[PB-293647/4] N79-26466
Italian noise legislation: Defects and insufficiencies of present situation
[FUB-18-1978] N79-26550
LAYOUTS
Design method for the layout of quasi optical elbows in a connection with circular wave guides
[FUB-6-1978] N79-26934
LEAD ORGANIC COMPOUNDS
Potential marine pollution from the Cavtat shipwreck
N79-26549
LEADING EDGES
A study of the drooped leading edge airfoil — on wind tunnel models to reduce spin entry after stall
[NASA-CR-158717] N79-26013
Effects of wing leading-edge deflection on low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration — wind tunnel tests
[NASA-TP-1434] N79-26020
Summary of past experience in natural laminar flow and experimental program for resilient leading edge
[NASA-CR-152276] N79-26024
LEAKAGE
Blending of hydrogen in natural gas distribution systems. Volume 3: Gas blends leakage tests of selected distribution system components
[CONS/2925-3] N79-26229
LEARNING MACHINES
Learning automata: A critique
[S/IS-7703] N79-26843
LEAST SQUARES METHOD
An approach to biased estimation in regression analysis
N79-26839
The least-squares estimation of latent trait variables by a Hilbert space approach
[AD-A067279] N79-26847
Least squares prediction for mixed autoregressive moving average time series
[AD-A067768] N79-26850
The least squares adjustment of errors in level surveys
[NPL-DNACS-9/78] N79-26862
LEGIBILITY
A photometric and legibility assessment of Aerospace Optics, Incorporated Vivisun 20/20 display
[AD-A067668] N79-26786
LENGTH
Comments on repeater distance dimensioning in coaxial cable digital data transmission
[FUB-26-1977] N79-26337
LENSES
Gabor lens theory
[BNL-25023] N79-26913
LEVITATION
Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method — temperature dependence
[NRC/CNR-TT-1942] N79-26173
LIBRARIES
Development of mathematical software and mathematical software libraries
[AD-A068023] N79-26814
LIFTING BODIES
Lifting bodies derived from supersonic flows past inclined circular and elliptic cones
[AD-A068003] N79-26026
LIGHT EMITTING DIODES
Analysis of a model for the interpretation of chromatic delay in light emitting diodes
[FUB-31-1977] N79-26338
LIGHT SCATTERING
Light scattering from phase separated glass
N79-26207
Correction of phase distortion by nonlinear optical techniques
[AD-A066148] N79-26386
Optical instrument for in-stack monitoring of particle size
[PB-292751/5] N79-26561
Statistics of speckle propagation
[AD-A067885] N79-26933
Stimulated Brillouin sidescatter and backscatter of carbon dioxide laser radiation from a laser altered arc plasma
N79-26937
LIGHT TRANSMISSION
Radiation effects on optical fibers
[FUB-16-1978] N79-26936
LIGNITE
Preliminary environmental assessment of the lignite-fired CAFB
[PB-293225/9] N79-26569
LIMBS [ANATOMY]
Prosthesis coupling
[NASA-CASE-KSC-11069-1] N79-26772
LIMNOLOGY
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578
LINE OF SIGHT COMMUNICATION
Aircraft obstruction of microwave links
[PB-292372/0] N79-26288
LINE SPECTRA
Energy levels and line intensities for the ground configuration of Pr3+ in LiYF4
[AD-A067845] N79-26140
Investigation of infrared spectra of atmospheric gases to support stratospheric spectroscopic investigations
[NASA-CR-158716] N79-26586
LINEAR EQUATIONS
Conjugate gradient type methods for unsymmetric and inconsistent systems of linear equations
[CTH-78.03-R] N79-26861
LINEAR POLARIZATION
Analytic models for the treatment of alternant linear heteropolymers
N79-26203
LINEAR PROGRAMMING
Splitting the bump in an elimination factorization
[AD-A067712] N79-26849
LINEAR SYSTEMS
Optimal feedback controls for parameter identification
[AD-A067265] N79-26828
Linear state feedback, quadratic weights, and closed loop eigenstructures
[NASA-CR-158755] N79-26844
Note on the practical significance of the Drazin inverse
[NPL-DNACS-13/79] N79-26864
Estimation for uncertain linear systems with jump parameters
N79-26874
On linear differential systems having separable exponential form solutions with application to the calculation of transition matrices
N79-26879
LININGS
Wear properties of dry bearing liners at ambient and elevated temperatures: A preliminary survey
[RAE-TR-78063] N79-26407
LINKAGES
Multiparametric optimization of four-bar and six-bar linkages
N79-26238
LIQUID ALLOYS
Diffusivity and solubility of nitrogen in multi-component liquid iron alloys containing alloying elements up to 50 wt% at 1600 C
N79-26162
LIQUID CHROMATOGRAPHY
Thermodynamic studies of ternary mixtures by gas-liquid chromatography
N79-26124
LIQUID CRYSTALS
A study of the acousto-optic effect in nematics as a means of acoustic field imaging
[AD-A067173] N79-26986
Low frequency phenomena in smectic A liquid crystals
N79-26993
LIQUID FLOW
Pulsed neutron measurement of single and two-phase liquid flow
[CONF-781113-31] N79-26896
LIQUID HYDROGEN
Hydrogen storage devices for automobiles
[BNL-25263] N79-26518
LIQUID LEVELS
Radio frequency liquid level gauging in propane tank car safety tests: A feasibility study
[PB-292978/4] N79-26381
LIQUID METAL FAST BREEDER REACTORS
High temperature properties of nuclear reactor coolants and thermodynamic power cycle working Fluids — in liquid metal fast breeder reactors
[COO-3027-37] N79-27001
LIQUID METALS
Thermodynamic and kinetic investigations of liquid metal-oxygen systems using solid state electrochemical methods
N79-26171

Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method --- temperature dependence
[NRC/CNR-TT-1942] N79-26173
A chemical theory for the thermodynamics of highly solvated liquid metal mixtures
N79-26996
Thermodynamic characterization of liquid metals at high temperature by isobaric expansion measurements --- platinum
[UCRL-80114] N79-27000

LIQUID PROPELLANT ROCKET ENGINES
Performance and heat transfer of high energy rocket engines with thrust variation
[ILR-21] N79-26111

LIQUID SLOSHING
INTELSAT 4 in orbit liquid slosh tests and problems in the theoretical analysis of the data
N79-26091

LIQUID-VAPOR EQUILIBRIUM
Liquid-vapor equilibrium measurement and prediction of the binary and ternary systems consisting of methane, ethane, and carbon dioxide at 270.00 K
N79-26130

LIQUID-VAPOR INTERFACES
The prediction of geysering in fluid transfer lines by flooding theory
N79-26346

LIQUIDS
Enthalpy measurements for coal-derived liquids
N79-26997

LISP [PROGRAMMING LANGUAGE]
A multiprocessing system for the direct execution of LISP
N79-26809

LITHIUM
Electric power from laser fusion: The HYLIFE concept
[UCRL-81259-REV-1] N79-26524

LITHIUM FLUORIDES
Energy levels and line intensities for the ground configuration of Pr3+ in LiYF4
[AD-A067845] N79-26140

LITHIUM NIOBATES
Angular addressing properties of volume Fourier transform holograms in iron-doped lithium niobate
N79-26371
Growth of high phase-match temperature LiNbO3 single crystals
[UCRL-13939] N79-26991

LITHOGRAPHY
Fresnel zone lens fabricated by electron beam lithography in thin film waveguide
N79-26305

LIVER
Cu-content of the liver of young mice in relation to a defect in the Cu-metabolism
[IRI-133-77-02] N79-26764

LOAD DISTRIBUTION [FORCES]
Effects of truncation of a predominantly compression load spectrum on the life of a notched graphite/epoxy laminate
[NASA-TM-80114] N79-26427

LOADING MOMENTS
Analysis of rigid pavement on viscoelastic foundation subjected to moving loads
N79-26422

LOADS [FORCES]
Concentrated force problems in transverse isotropy
N79-26420
Single disc springs: Elastic deflections, stresses, stiffnesses and resiliences
[ESDU-78043] N79-26421
Assessment of an empirical technique for estimating vehicle aerodynamic drag from vehicle shape parameters
[PB-292160/9] N79-27025

LOW ASPECT RATIO WINGS
Effects of wing leading-edge deflection on low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- wind tunnel tests
[NASA-TP-1434] N79-26020

LOW COST
Low cost components: Selection and acquisition of microelectronic devices
[AD-A067667] N79-26321

LOW CURRENTS
Low current linearization of magnetic amplifier for dc transformer
[NASA-CASE-NPO-14617-1] N79-26311

LOW FREQUENCIES
Determination of the statistical properties of the digital sum of line codes to evaluate the relative average increase in error probability due to low frequency distortion in data transmission
[FUB-3-1978] N79-26281
An impedance technique for determining low-frequency payload environments
[NASA-CR-3143] N79-26428
Low frequency phenomena in smectic A liquid crystals
N79-26993

LOW NOISE
Low-noise preamplifier for gravitational wave experiments
[LPS-78-11] N79-26339

LOW PASS FILTERS
Averaging filter for analog processing of gravitational signals
[LPS-78-10] N79-26280

LOW SPEED STABILITY
Effects of wing leading-edge deflection on low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- wind tunnel tests
[NASA-TP-1434] N79-26020

LOW TEMPERATURE PHYSICS
NMR of dilute ortho-H[sub]2 impurities in solid para-H[sub] 2 at temperatures below 1 K
N79-26972

LOW THRUST PROPULSION
Performance of low thrust attitude control engines. Part 1: Nozzle flow and performance prediction
[TUM-LRT-TB-77/5-PT-1] N79-26113
Performance of low thrust attitude control engines. Part 2: Hydrazine engines theoretical performance and transport properties of reaction products
[TUM-LRT-TB-77/6-PT-2] N79-26114
Performance of low thrust attitude control engines. Part 3: Power augmented hydrazine performance and thermodynamic properties of reaction products
[TUM-LRT-TB-77/7-PT-3] N79-26115
Performance of low thrust attitude control engines. Part 4: Correlation equation for experimental boundary layer losses
[TUM-LRT-TB-77/14-PT-4] N79-26116
Performance of low thrust attitude control engines. Part 5: Thrust loss determination by test-data-correlation
[TUM-LRT-TB-78/1-PT-5] N79-26117
Performance of low thrust attitude control engines. Part 6: Computation of boundary layer losses
[TUM-LRT-TB-78/2-PT-6] N79-26118

LUBRICATING OILS
Slicing of silicon into sheet material. Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158743] N79-26978

LYMAN ALPHA RADIATION
Variability of Lyman-alpha emission from Jupiter
[NASA-CR-158756] N79-27045

M

MACHINE TOOLS
Vibration isolation measurements on a precision machine tool
[LA-UR-78-3252] N79-26404

MACHINERY
Dynamic analysis and design sensitivity analysis of mechanisms with intermittent motion
N79-26399

MAGNET COILS
SLPX: Superconducting long-pulse tokamak experiment --- magnetics system
[PPPL-1488] N79-26947

MAGNETIC AMPLIFIERS
Low current linearization of magnetic amplifier for dc transformer
[NASA-CASE-NPO-14617-1] N79-26311

MAGNETIC CIRCUITS
Development of linear and nonlinear magnetic circuit models for the prediction of step motor static performance
N79-26297

MAGNETIC DISTURBANCES
Magnetic dips in the solar wind
[NASA-TM-80477] N79-27053

MAGNETIC FIELD CONFIGURATIONS
Physical processes in directed ion beam sputtering
[NASA-CR-159567] N79-26943

MAGNETIC FIELDS
Upper critical magnetic field of superconducting films with magnetic impurities
N79-26962

MAGNETIC MATERIALS
Upper critical magnetic field of superconducting films with magnetic impurities
N79-26962
Specific heat of superconducting films of indium and of indium alloyed with magnetic impurities
N79-26968

MAGNETIC MEASUREMENT
Thule Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-131-6] N79-26601
Thule Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-132-4] N79-26602
Thule Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-133-2] N79-26603
Godhavn Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-128-6] N79-26604
Godhavn Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-129-4] N79-26605
Godhavn Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-130-8] N79-26606
Rude Skov Geophysical Observatory: Magnetic results, 1975
[ISBN-87-7478-149-9] N79-26607
Rude Skov Geophysical Observatory: Magnetic results, 1976
[ISBN-87-7478-150-2] N79-26608

MAGNETIC PROPERTIES
The physics of braided-shield coaxial cable
N79-26251

MAGNETIC STORAGE
Intelligent magnetic bubble memories
N79-26788

MAGNETIC STORMS
Investigation of the phenomenology of the Arctic ionosphere and its relation to the phenomenology of Arctic particle precipitation, part I
[AD-A067711] N79-26595

MAGNETIC SUSPENSION
Magnetic suspension and pointing system --- on a carrier vehicle
[NASA-CASE-LAR-11889-1] N79-26372

MAGNETIC TAPES
The design of a high packing density PCM magnetic tape replay system
[RAE-TR-77140] N79-26378

MAGNETIC VARIATIONS
Magnetic dips in the solar wind
[NASA-TM-80477] N79-27053

MAGNETOHYDRODYNAMIC FLOW
Inertial perturbations to inertialess magnetohydrodynamic and rotating flows
N79-26342

MAGNETOHYDRODYNAMIC GENERATORS
Evaluation of available MHD seed-regeneration processes on the basis of energy considerations
[ANL/MHD-78-4] N79-26519
Control of sulfur dioxide and particulate emission in MHD power systems using high sulfur coal
[CONF-781109-18] N79-26546

MAGNETOHYDRODYNAMIC STABILITY
Plasma instabilities in the equatorial F-region: Natural and artificial mechanisms
[AD-A068040] N79-26598
Stability of the critical surface in the presence of strong electromagnetic radiation
N79-26940
Resistive ballooning mode equation
[ORNL-TM-6629] N79-26954
Analytical theory of drift waves and drift Alfven waves in tokamaks
[PPPL-1512] N79-26958

MAGNETOHYDRODYNAMIC WAVES
Analytical theory of drift waves and drift Alfven waves in tokamaks
[PPPL-1512] N79-26958

MAGNETOHYDRODYNAMICS
Stability calculations for MHD magnets
[CONF-781055-4] N79-26960

MAGNETOSPHERE
Investigation of the phenomenology of the Arctic ionosphere and its relation to the phenomenology of Arctic particle precipitation, part I
[AD-A067711] N79-26595
Particle acceleration in pulsar magnetospheres
N79-27048
Space Activities in 1977 --- Belgian research centers
N79-27063

MAINTENANCE
An automated software maintence tool for large-scale operating systems
[AD-A067799] N79-26813

MAN MACHINE SYSTEMS
Analytical methods for biotechnological design of man machine systems: Work on system ergonomy
[FB-28] N79-26787
Principles of the construction of a new generation of SAPR's
N79-27066

MANAGEMENT INFORMATION SYSTEMS
Federal Information Centers Act
[S-REPT-95-1129] N79-27009
The mechanical properties data center
[AD-A067974] N79-27016
A information retrieval system for research file data --- utilizing a computer program
[AD-A068021] N79-27017

MANAGEMENT METHODS
Product differentiation in computer services
N79-26824
Model management systems: A framework for development
[AD-A067246] N79-27003
Management of federal R and D for commercialization: Executive summary
[PB-292851/3] N79-27036
Management of federal R and D for commercialization
[PB-292852/1] N79-27037

Management of federal R and D for commercialization: Appendices: Supporting documentation
[PB-292853/9] N79-27038

MANAGEMENT PLANNING
Earth information from space by remote sensing
[PB-292736/6] N79-26454
SCATS: SRB Cost Accounting and Tracking System handbook
[NASA-TM-78302] N79-27002
A comparison of heuristic methods used in hierarchical production planning
[AD-A066932] N79-27004

MANAGEMENT SYSTEMS
Development of a drainage with flood control management system for urbanizing communities
N79-27022

MANGANESE
The effect of manganese and nickel additions in the welding flux on the fusion zone of pearlitic ductile iron
N79-26164
Catalytic properties of natural and rare-earth-promoted manganese nodules
[PB-293267/1] N79-26200

MANGANESE ALLOYS
Ultrasonic studies of radiation damage in an aluminum-manganese alloy
N79-26965

MANGANIN [TRADEMARK]
Fabrication of manganin stress gauges for use in detonating high explosives
[UCRL-81371] N79-26377

MANIPULATORS
Study of modeling and evaluation of remote manipulation tasks with force feedback
[NASA-CR-158721] N79-26785

MANUFACTURING
The production of ethanol from agricultural waste: An economic evaluation
[PB-292552/7] N79-26233

MAP MATCHING GUIDANCE
A digital scene matching technique for geometric image correction and autonomous navigation
N79-26085

MARINE BIOLOGY
An evaluation of the effects of geothermal energy development on aquatic biota in the geysers area of California
[PB-293031/1] N79-26562

MARINE ENVIRONMENTS
Commercial digital/ADP equipment in an ocean environment. Volume 1: Performance study
[AD-A067662] N79-26796

MARKETING
Management of federal R and D for commercialization: Executive summary
[PB-292851/3] N79-27036
Management of federal R and D for commercialization
[PB-292852/1] N79-27037
Management of federal R and D for commercialization: Appendices: Supporting documentation
[PB-292853/9] N79-27038

MARKOV CHAINS
Markovian multiserver queueing systems with servers in series
N79-26826

MARKOV PROCESSES
Learning automata: A critique
[S/IS-7703] N79-26843

MARSHLANDS
Partially annotated tidal marsh bibliography. Second edition: Selected key work index
[PB-293466/9] N79-26760

MARTINGALES
A general martingale approach to discrete time stochastic control and estimation
[AD-A067834] N79-26852

MASERS
Theory of solid state cyclotron maser
[AD-A066174] N79-26389

MASS FLOW
Thrust and mass flow characteristics of four 36 inch diameter tip turbine fan thrust vectoring systems in and out of ground effect
[NASA-CR-152239] N79-26056
The prediction of geysering in fluid transfer lines by flooding theory
N79-26346
Heat and mass flow analysis of packed-bed thermal regenerators
[CAES-9] N79-26523

MASS SPECTROMETERS
Measurement of PCB emissions from combustion sources
[PB-293360/4] N79-26154

MASS SPECTROSCOPY
Photodissociation cross sections and spectroscopy of atmospheric positive ions
[AD-A067186] N79-26592

MASS TRANSFER
Steady state and stability characteristics of catalytic arrays
N79-26129
A control-volume based finite element method for convective heat and mass transfer
N79-26354

MATERIALS HANDLING
Dynamic analysis to establish normal shock and vibration of radioactive material shipping packages --- mechanical shock during rail transportation
[PB-293660/7] N79-26409

MATHEMATICAL MODELS
Development of a research plan for the improvement of aerodynamic models for analysis of ballistic range data
[AD-A067950] N79-26029
The dynamic modelling of a slotted test section
[NASA-CR-159069] N79-26065
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Research Association
N79-26079
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Res. Association
N79-26080
A pore model for gasification reactions: An application to the system C-CO2-CO-N2
N79-26127
WEDCOM 4: A FORTRAN code for the calculation of ELF, VLF, and LF propagation in a nuclear environment. Volume 3: Computational models
[AD-A066977] N79-26260
Suitability of input-output models for evaluating the impact of phosphorous loadings to Lake Champlain
[PB-293442/0] N79-26464
FEDBAK03: A computer program for the modeling of first order consecutive reactions with feedback under a steady state multidimensional natural aquatic system. Program documentation and user's guide
[PB-292760/6] N79-26553
Commuter exposure modeling methodologies --- to air pollution
[PB-292995/8] N79-26557
Model of Advection, Diffusion and Chemistry of Air Pollution [MADCAP], evaluated at San Diego, air basin.
[PB-292526/1] N79-26565
Predictions of highway emissions by a second order closure model
[PB-292703/6] N79-26566
The development of mathematical models for the prediction of anthropogenic visibility impairment, volume 1
[PB-293119/4] N79-26613
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 2: Appendices
[PB-293120/2] N79-26614
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 3: Case studies for selected scenarios
[PB-293121/0] N79-26615
The experimentation of a baroclinic model with 5 levels in the south-eastern Europe, including the orography effect
N79-26663
Proceedings of a Workshop on Coastal Sediment Transport Study
[PB-293632/6] N79-26757
Performance prediction of computer architectures operating on linear mathematical models
N79-26789
Factors affecting the usefulness of flow charts and other formats for computer programs
N79-26803
Trends in reliability modeling technology for fault tolerant systems
[NASA-TM-80089] N79-26810
A primer for MLAB: An on-line modelling laboratory
[PB-292895/0] N79-26822
Optimal feedback controls for parameter identification
[AD-A067265] N79-26828
Study of improved modeling and solution procedures for nonlinear analysis --- aircraft-like structures
[NASA-CR-158750] N79-26875
Risk methodology for geologic disposal of radioactive waste
[NUREG/CR-1458] N79-26906
Basic physical phenomena neutron production and scaling of the dense plasma focus
[IPF-77-7] N79-26961
Doping process in silicon epitaxy: Transfer function and physicochemical model
N79-26976
Model management systems: A framework for development
[AD-A067246] N79-27003
Inventory of data bases, graphics packages, and models in Department of Energy laboratories
[ORNL-EIS-144] N79-27018
Highway capacity, measures of effectiveness, and flow theory
[PB-292763/0] N79-27029

MATHEMATICAL PROGRAMMING
NEWSUMT: A FORTRAN program for inequality constrained function minimization, users guide
[NASA-CR-159070] N79-26811
Development of mathematical software and mathematical software libraries
[AD-A068023] N79-26814
Mathematical programming solution to the phase problem of crystallography
N79-26970

MATRICES [MATHEMATICS]
Functions of a particular class of singular matrices
[FUB-12-1977] N79-26858
Kronecker's canonical form and the QZ algorithm
[NPL-DNACS-10/78] N79-26863
Note on the practical significance of the Drazin inverse
[NPL-DNACS-13/79] N79-26864
On linear differential systems having separable exponential form solutions with application to the calculation of transition matrices
N79-26879

MAXIMUM LIKELIHOOD ESTIMATES
Multiple object tracking with non-unique data-to-object association via generalized hypothesis testing --- tracking several aircraft near each other or ships at sea
N79-26090
Varied applications of a new maximum-likelihood code with complete covariance capability
[HEDL-SA-1616-FP] N79-26818

MAXIMUM USABLE FREQUENCY
MINIMUF-3.5 improved version of MINIMUF-3, a simplified HF MUF prediction algorithm
[AD-A066256] N79-26256

MEASUREMENT
Equipment for a laser surface measuring system
[BDX-613-1848-REV] N79-26398

MEASURING INSTRUMENTS
Research on an automated inertial azimuth measuring system
[AD-A067938] N79-26043
ORNL PWR-BDHT two-phase flow instrumentation and analysis improvements
[CONF-781146-9] N79-26366
Contour measurement system
[NASA-CASE-MFS-23726-1] N79-26439
Study of a density cell to measure suspended load
[PB-292954/5] N79-26452
Measurement techniques and instruments suitable for life-prediction testing of photovoltaic arrays
[NASA-CR-158733] N79-26486
Research on severe local storms --- corona probe to measure electric fields at earth surface
[PB-293924/7] N79-26748

MECHANICAL DEVICES
Development of an electrical energy converter for driving left heart assist blood pumps
[PB-293510/4] N79-26780

MECHANICAL DRIVES
Speed reducers-increasers
N79-26481

MECHANICAL PROPERTIES
Time-temperature correspondence of the dynamic mechanical properties of halthane 73-18 and halthane 87-1
[BDX-613-1867-REV] N79-26151
Structural design of flexible pavement. Part 1: Summary of performance
[PB-292787/9] N79-26245
The physics of braided-shield coaxial cable
N79-26251
Dynamic analysis and design sensitivity analysis of mechanisms with intermittent motion
N79-26399
Investigations into the mechanical behavior of composite bolted joints
[NASA-CR-158752] N79-26402
The mechanical properties data center
[AD-A067974] N79-27016

MECHANICAL SHOCK
Dynamic analysis to establish normal shock and vibration of radioactive material shipping packages --- mechanical shock during rail transportation
[PB-293660/7] N79-26409

MEDICAL SERVICES
Telehealth handbook: A guide to telecommunications technology for rural health care
[PB-292557/6] N79-26778

MELTING
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208
Digital simulation of snowmelt runoff
[PB-293252/3] N79-26457

MELTS [CRYSTAL GROWTH]
Continuous Czochralski growth. Silicon sheet growth development of the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158730] N79-26496
Large area silicon sheet by EFG --- quality control and productivity of edge-defined film-fed growth of ribbons
[NASA-CR-158731] N79-26501

MERCURY [METAL]
Investigation of gain and absorption processes in the cadmium-mercury excimer
[AD-A066321] N79-26388
MERCURY ALLOYS
Thermodynamic properties of uranium-mercury system
[IS-T-824] N79-26999
MERCURY TELLURIDES
Growth and homogeneity characterization of mercury cadmium telluride crystals
[AD-A067670] N79-26990
MESOMETEOROLOGY
Some mesoscale meteorological phenomena induced by the mountain
N79-26672
MESSAGES
EMS [Electronic Message Service]: System definition and evaluation. Executive summary
[PB-292933/9] N79-26291
EMS [Electronic Message Service]: System definition and evaluation
[PB-292934/7] N79-26292
METABOLISM
Cu-content of the liver of young mice in relation to a defect in the Cu-metabolism
[IRI-133-77-02] N79-26764
Results of a 64Cu-loading test applied to patients with an inherited defect in their Cu-metabolism [Menkes' disease]
[IRI-133-77-04] N79-26774
The oral 64Cu-loading test: Applications and problems
[IRI-133-78-02] N79-26775
METAL COATINGS
Materials problems with inertial confinement fusion targets --- gold and tungsten coatings
[LA-UR-79-76] N79-26945
METAL CRYSTALS
Metastable superconducting alloys
[CALT-822-104] N79-26181
METAL FATIGUE
The role of environment, frequency and wave shape during fatigue crack growth in aluminum alloys
[VTH-LR-270] N79-26187
METAL FIBERS
Stress relaxation in coiled ribbons of Fe40Ni40P14B6 and Fe29Ni49P14B6Si2
[AD-A068000] N79-26432
METAL FILMS
Structure of 001 grain boundaries in bicrystalline thin films of gold
N79-26166
Upper critical magnetic field of superconducting films with magnetic impurities
N79-26962
Specific heat of superconducting films of indium and of indium alloyed with magnetic impurities
N79-26968
METAL HYDRIDES
Metal hydride research and development program at Brookhaven National Laboratory
[BNL-25215] N79-26516
Hydrogen storage devices for automobiles
[BNL-25263] N79-26518
METAL IONS
Fate of metal ions during domestic treatment of water containing organics
[PB-293147/5] N79-27034
METAL OXIDE SEMICONDUCTORS
Theory of charge pumping in MOS transistors
N79-26301
METAL OXIDES
The role of mold atmospheres in the penetration of molten steel into sand molds
N79-26163
Oxygen partial pressure: A key to alloying and discovery in metal oxide-metal eutectic systems
[CONF-781172-1] N79-26182
METAL PLATES
Heavy plate of quenched and tempered steel with 80kg/mm2 tensile strength
[PB-292929/7] N79-26199
METAL WORKING
Computer-aided analysis and design of the shape rolling process for producing turbine engine airfoils
[NASA-CR-135367] N79-26175
METALS
Air quality data for metals 1975 from the National Air Surveillance network
[PB-293106/1] N79-26570
The mechanical properties data center
[AD-A067974] N79-27016
METASTABLE STATE
Metastable superconducting alloys
[CALT-822-104] N79-26181
METEOROLOGICAL CHARTS
Insolation duration, insolation quotient in France: 1951 - 1970
[MN-MONO-105] N79-26620
METEOROLOGICAL INSTRUMENTS
Comparative investigation of dynamic properties of some propeller vanes
[KNMI-WR-78-1] N79-26738
METEOROLOGICAL PARAMETERS
Lake-effect storms of Lake Ontario
N79-26616
Proceedings of the Fifteenth International meeting on Alpine Meteorology, volume 1
[SZ-ISSN-0080-7346] N79-26623
Remote measurement of the atmospheric parameters, using a radioacoustic sounder
N79-26625
A report on objective weather forecasting methods of the central Institute of Meteorology and Geodynamics, with special consideration of the Model Output Statistics [MOS] method
N79-26636
An objective analysis of the climatological parameters of thunderstorm activity over the Rumanian Carpathians
N79-26705
Results from an attempt to interpolate temperature and wind profiles with respect to time with a one-dimensional boundary layer model
[TR-18] N79-26712
Balloon-borne ECC ozonesonde data, appendix A
N79-26729
The use of 1WW historical terminal forecast performance tables
[AD-A067093] N79-26731
The 1283ID Lance missile no. 2486, round no. 325 DSL [18 January 1979]
[AD-A067675] N79-26734
Diagnostic analyses of the GATE A/B scale area at individual time periods
[PB-292961/0] N79-26743
METEOROLOGICAL RADAR
Day-to-day variations or atmospheric tides as observed by meteor radar
[UILU-ENG-79-2506] N79-26588
Feasibility study of satellite-borne lidar global wind monitoring system
[PB-293879/3] N79-26746
Manually digitized radar data: Interpretation and application
[PB-293810/8] N79-26747
METEOROLOGICAL SATELLITES
Meteorological studies: Atmospheric analysis, automated weather system development, satellite studies
[AD-A067937] N79-26733
METEOROLOGICAL SERVICES
The IMI network in Sweden: Present equipment, methods, and plans for improvement
[AC-40] N79-26740
National severe local storms operations plan
[PB-294326/4] N79-26745
METEOROLOGY
A history of air pollution meteorology through 1969
[PB-293741/5] N79-26559
Association between meteorological conditions and high ozone and sulfate concentrations: A 1974 episode in the Eastern United States
[PB-293485/9] N79-26611
Outline of Apennine meteorology
N79-26655
Acoustic radar and its use in meteorology
[TR-20] N79-26714
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
The intertropical convergence zone experiment: Background and summary
N79-26716
Operational activities
N79-26717
Notes on the meteorology of the intertropical convergence zone during the July 1977 experiment
N79-26718
Airborne measurements in support of a field test of the stabilization of supersized water droplets: Pilot experiment
[AD-A067645] N79-26735
METHANE
Liquid-vapor equilibrium measurement and prediction of the binary and ternary systems consisting of methane, ethane, and carbon dioxide at 270.00 K
N79-26130
Non-urban hydrocarbon concentrations in ambient air north of Houston, Texas
[PB-293227/5] N79-26580
METHOD OF CHARACTERISTICS
Comparison between two calculation procedures for internal combustion engine exhaust systems
N79-26406
METROLOGY
Activities of the Division of Quantum Metrology
[NPL-QU-AR-76] N79-26736
MICE
Cu-content of the liver of young mice in relation to a defect in the Cu-metabolism
[IRI-133-77-02] N79-26764
MICROANALYSIS
Metastable superconducting alloys
[CALT-822-104] N79-26181
Techniques for the preparation and analysis of standard silicon semiconductor specimens for the ion microprobe mass analyzer
[PB-292806/7] N79-26341
MICROCLIMATOLOGY
Microclimatic conditions in the mountain mixed forest at different cutting procedures
N79-26653
MICROELECTRONICS
Solvent removable coatings for contaminant protection of microcircuits
[AD-A067745] N79-26212
Electrical characterization of Hughes HCMP 1853D and RCA CDP1853D N-bit, CMOS, 1-of-8 decoder microcircuits
[HAC-REF-E0963] N79-26315
Low cost components: Selection and acquisition of microelectronic devices
[AD-A067667] N79-26321
MICROFIBERS
Polyethylene deformation analysis
N79-26425
MICROMETEOROLOGY
A micrometeorological network for study of transport and diffusion of pollutants in two Apennine Valleys
N79-26638
MICROMINIATURIZATION
Slicing of silicon into sheet material: Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158732] N79-26979
MICROPHONES
Video telephonic service: Study on the influence of microphone characteristics and band width on intelligibility and quality of audio signals
[FUB-36-1977] N79-26272
Microphone windscreen performance
[PB-292967/7] N79-26289
MICROPROCESSORS
Shoe-box orbit determination system for SMM preliminary results
N79-26092
Electrical characterization of standard and radiation-hardened RCA CDP1856D 4-BIT, CMOS, bus buffer/separator
[NASA-CR-158725] N79-26314
Fault simulation, analysis and diagnosis of a microprocessor
N79-26790
A study of the construction of a distributive processing system using standard components
N79-26791
A microprocessor sequencer for the UK T5 ion thruster and power conditioner unit
[RAE-TR-78057] N79-26797
The microprocessor and its application in a laboratory environment
[RAE-TM-IT-165] N79-26798
A hierarchical model of portable input/output
N79-26808
MICROPROGRAMMING
Advanced information processing using microarchitecture programmed design
N79-27008
MICROSTRIP TRANSMISSION LINES
Microstrip millimeter wave antenna study
[AD-A067948] N79-26264
MICROSTRUCTURE
The effects of microstructure and strength on the fracture toughness of ultra-high strength aluminum alloys
N79-26159
High-cycle fatigue behavior of a cobalt-based eutectic alloy
N79-26161
Gas bubble and damage microstructure in helium implanted nickel
[CONF-780851-4] N79-26178
MICROWAVE AMPLIFIERS
Computer-aided design of microwave integrated parametric amplifiers
N79-26306
MICROWAVE ATTENUATION
Relationship between raingauge tipping volume and rain rate distributions
[FUB-32-1977] N79-26739
MICROWAVE EMISSION
Microwave curing of epoxy resins
[AD-A067732] N79-26214
MICROWAVE RADIOMETERS
The development of a microwave radiometer for use as a highway ice detector
[PB-292645/9] N79-26382
MICROWAVE TRANSMISSION
Aircraft obstruction of microwave links
[PB-292372/0] N79-26288
MICROWAVES
Quasi-optical elbows in circular waveguide connections
[FUB-39-1977] N79-26273
Low noise devices for satellite communication systems
[RAE-TR-78076] N79-26279
Experimental observation of strong profile modification of an inhomogeneous plasma due to intense microwaves
N79-26941

MIDAIR COLLISIONS
Report of the FAA task force on aircraft separation assurance. Volume 1: Executive summary
[AD-A067905] N79-26042
MIDLATITUDE ATMOSPHERE
Rocket radio measurement of electron density in the nighttime ionosphere
[NASA-CR-157442] N79-26587
MILITARY AIR FACILITIES
An evaluation of the bird/aircraft strike hazard Dyess Air Force Base, Texas
[AD-A068026] N79-26039
MILITARY HELICOPTERS
Preliminary airworthiness evaluation AH-1S helicopter equipped with a Garrett infrared radiation suppressor and an AN/ALQ-144 jammer
[AD-A067757] N79-26047
MILITARY OPERATIONS
Commercial digital/ADP equipment in an ocean environment. Volume 1: Performance study
[AD-A067662] N79-26796
MILLIMETER WAVES
Millimeter wave satellite concepts. Volume 1: Executive summary
[NASA-CR-159504] N79-26101
Millimeter wave satellite concepts. Volume 2: Technical report
[NASA-CR-159503] N79-26102
Microstrip millimeter wave antenna study
[AD-A067948] N79-26264
Integrated millimeter waves generator
[LCR-489-315] N79-26336
MINES [EXCAVATIONS]
Remote sensing program
[E79-10211] N79-26440
Information base for waste repository design. Volume 5: Decommissioning of underground facilities
[PB-293405/7] N79-26904
Information base for waste repository design. Volume 1: Borehole and shaft sealing
[PB-293401/6] N79-26922
Information base for waste repository design. Volume 2: Equipment performance requirements
[PB-293402/4] N79-26923
Information base for waste repository design. Volume 3: Waste/rock interactions
[PB-293403/2] N79-26924
Information base for waste repository design. Volume 4: Mine structural features
[PB-293404/0] N79-26925
Information base for waste repository design. Volume 6: Excavation technology
[PB-293406/5] N79-26926
Information base for waste repository design. Volume 7: Executive summary
[PB-293407/3] N79-26927
MINICOMPUTERS
Navy laboratory interactive graphics study
[AD-A067402] N79-26816
MINIMAX TECHNIQUE
Minimax subset selection for the multinomial and Poisson distributions
[AD-A067187] N79-26868
MINING
A Kentucky energy resource utilization program
[PB-292949/5] N79-26538
MIRRORS
Optical quality of tilted spherical mirror unstable resonators
[AD-A068015] N79-26394
Plated copper substrates for the LASL Antares CO2 laser system --- mirror design
[LA-UR-79-9] N79-26397
Analysis of flat mirror V-trough solar concentrator N79-26472
MISSILE CONFIGURATIONS
Bumblebee program aerodynamic data. Part 3: Pressure fields at Mach numbers 1.5 to 2.0 --- for supersonic guided missiles
[NASA-CR-3116] N79-26021
Effect of nose bluntness and afterbody shape on aerodynamic characteristics of a monoplanar missile concept with bodies of circular and elliptical cross sections at a Mach number of 2.50
[NASA-TM-80055] N79-26023
MISSILE CONTROL
Holographically improved windows
[AD-A067914] N79-26376
MISSILES
Fire protection covering for small diameter missiles
[NASA-CASE-ARC-11104-1] N79-26100
MISSOURI
Ten-Ecosystem Study (TES) site 9, Washington County, Missouri
[E79-10218] N79-26445
MIXING
Droplet mixing and deposition in a turbulent flow N79-26356
Trace constituent mixing ratios in the lower stratosphere during the 1977 intertropical convergence zone experiment N79-26721
MIXING CIRCUITS
Microstrip millimeter wave antenna study
[AD-A067948] N79-26264
MIXTURES
Thermodynamic studies of ternary mixtures by gas-liquid chromatography N79-26124
Studies on flame propagation in powdered mixtures N79-26128
A chemical theory for the thermodynamics of highly solvated liquid metal mixtures N79-26996
MODAL RESPONSE
An evaluation of nozzle response to transient disturbances N79-26355
MODEMS
Modem identification experiments
[AD-A067538] N79-26829
MODULATORS
Integrated millimeter waves generator
[LCR-489-315] N79-26336
MOLECULAR BEAMS
Crossed molecular beam study of the reactions of oxygen and fluorine atoms
[AD-A067848] N79-26894
MOLECULAR CHAINS
Analytic models for the treatment of alternant linear heteropolymers N79-26203
MOLECULAR COLLISIONS
Low energy ion-molecule reaction dynamics and chemiionization kinetics
[COO-4694-1] N79-26897
MOLECULAR ORBITALS
Development of practical MO techniques for prediction of the properties and behavior of materials --- oxazoles and imidazoles
[AD-A067068] N79-26892
MOLECULAR RELAXATION
Effect of vibrational excitation in reactions of OH with H2
[AD-A058571] N79-26134
Characterization and effects of molecular orientation in amorphous polymers N79-26204
MOLECULAR ROTATION
Raman studies of the orientational motions of small diatomics dissolved in argon, 1; and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite, 2 N79-26122
MOLECULAR STRUCTURE
Tetracarbon metallocarboranes. 6: Stereochemical relationships between Co2C4B6 cage isomers formed by oxidative fusion. Crystal structure of [n5-C5h5]2Co2[CH3]4C4B6H6 isomer 5
[AD-A067836] N79-26989
MONITORS
Optical instrument for in-stack monitoring of particle size
[PB-292751/5] N79-26561
MONOIDS
Contact spaces for singularities over perfect fields N79-26834
MONOPOLE ANTENNAS
Near-field radiation properties of simple linear antennas with applications to radiofrequency hazards and broadcasting
[PB-292647/5] N79-26290
MONTE CARLO METHOD
Improvement of the steady floating random walk Monte Carlo method near straight line and circular boundaries with application to groundwater flow
[PB-292560/0] N79-26453
MOORING
Air Deployed Oceanographic Mooring [ADOM]
[AD-A068001] N79-26755
MORPHOLOGY
Morphology and sintering of platinum, palladium, rhodium and platinum-alloys on SiO2 and graphite N79-26168
MOTOR VEHICLES
Assessment of an empirical technique for estimating vehicle aerodynamic drag from vehicle shape parameters
[PB-292160/9] N79-27025
Highway capacity, measures of effectiveness, and flow theory
[PB-292763/0] N79-27029
MOUNTAINS
Characterizing thermal conditions in mountainous regions from the standpoint of requirements for cultivated plant growth N79-26652
Microclimatic conditions in the mountain mixed forest at different cutting procedures N79-26653
Outline of Apennine meteorology N79-26655
Recent and ice age climatic ecological arrangement of the African high mountains between the Mediterranean and the equator N79-26656
Table-maps as a method of representing data on climate of mountainous regions with examples from Norwegian phenology and of precipitation distribution over the eastern Alps N79-26658
Some mesoscale meteorological phenomena induced by the mountain N79-26672
The analysis of the influence of the Romanian Carpathians upon wind forecasting in Romania N79-26673
Peculiar humidity-thermal conditions in a carpathian mountain valley in relation to different weather types N79-26679
Global solar radiation in a vertical profile of the Carpathians N79-26685
The mountain mass of Olympus as a heating source of the lower troposphere N79-26688
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation N79-26698
Probability and productivity of important snowfalls in the mountains, particularly in the region of Davos N79-26699
The ratio of the number of days with snow cover to that with snowfall in the Serbian Mountains of Yugoslavia N79-26700
Situations causing late snowfall over the French Alps N79-26703
Ice depositions in Rumanian mountainous regions N79-26704
An objective analysis of the climatological parameters of thunderstorm activity over the Rumanian Carpathians N79-26705
Preliminary report on planning of the GARP mountain sub-program [ALPEX] N79-26710
MULTIPATH TRANSMISSION
Large volume multiple path nuclear pumped laser
[NASA-CASE-LAR-12592-1] N79-26385
MULTIPLEXING
Criteria for the dimensioning of numerical multiplexing frames
[FUB-27-1977] N79-26859
MULTIPROCESSING [COMPUTERS]
The implementation and evaluation of parallel algorithms on C.mmp N79-26801
Automatically decomposing signal processing applications on multiprocessors N79-26806
A multiprocessing system for the direct execution of LISP N79-26809
MULTIPROGRAMMING
Adaptive allocation of decision making responsibility between human and computer in multitask situations N79-26827
MULTIVARIATE STATISTICAL ANALYSIS
A study of the effects of error of measurement on multiple regression analysis and a comparison of possible correction techniques N79-26840
Two concepts of positive dependence, with applications in multivariate analysis
[AD-A067545] N79-26848
MUONS
Hadron production in high energy muon scattering N79-26903
Expected muon spectra at two different latitudes
[KGI-77-2] N79-27058

N

NASA PROGRAMS
Quiet propulsive lift for commuter airlines
[NASA-TM-78596] N79-26035
NATURAL GAS
Development of combustion data to utilize low-Btu gases as industrial process fuels
[FE-2489-30] N79-26143
Blending of hydrogen in natural gas distribution systems. Volume 3: Gas blends leakage tests of selected distribution system components
[CONS/2925-3] N79-26229
NATURAL LANGUAGE [COMPUTERS]
Algorithms needed in a natural language understanding system
[PB-293232/5] N79-26823
NAVIER-STOKES EQUATION
Experimental studies of coherent anti-Stokes Raman spectroscopy in liquids N79-26123
NAVY
Commercial digital/ADP equipment in an ocean environment. Volume 1: Performance study
[AD-A067662] N79-26796
NEGATIVE IONS
Atomic reaction rates in H[-] and D[-] plasmas
[UCID-18031] N79-26948
Negative ion based neutral beams for plasma heating
[BNL-24782] N79-26951

NEPHELOMETERS
Feasibility of shipboard laser-attenuation measurements with a portable transmissometer
[AD-A067665] N79-26732
NETWORK ANALYSIS
Simultaneous realization of input and transfer impedances in RC ladder networks
N79-26308
NETWORK SYNTHESIS
Simultaneous realization of input and transfer impedances in RC ladder networks
N79-26308
NEUTRAL BEAMS
Negative ion based neutral beams for plasma heating
[BNL-24782] N79-26951
NEUTRON ACTIVATION ANALYSIS
Pulsed neutron measurement of single and two-phase liquid flow
[CONF-781113-31] N79-26896
NEUTRON COUNTERS
Preliminary studies of microchannel plate photomultiplier tube neutron detectors for flight test applications
[SAND-78-8266] N79-26332
NEUTRON IRRADIATION
Neutron damage correlation experiments in semiconductor devices
[AD-A066886] N79-26987
NEUTRON SCATTERING
Scattering studies from polymer blends
N79-26202
NEUTRON SOURCES
Basic physical phenomena neutron production and scaling of the dense plasma focus
[IPF-77-7] N79-26961
NEUTRONS
Plasma neutron diagnostic techniques with good spatial and energy resolution
[UCRL-81120] N79-26956
NEW YORK
Remote sensing program
[E79-10211] N79-26440
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919
NEWTONIAN FLUIDS
Fluid mechanics of horizontal and vertical laminar Newtonian jets
N79-26347
NICKEL
Electrochemical and spectral investigations of Ni[II] ion equilibria in room temperature chloroaluminate solvents
[AD-A067782] N79-26138
The effect of manganese and nickel additions in the welding flux on the fusion zone of pearlitic ductile iron
N79-26164
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach
N79-26169
Gas bubble and damage microstructure in helium implanted nickel
[CONF-780851-4] N79-26178
NICKEL ALLOYS
Microstructural characterization of cast nickel aluminum bronze
[AUWE-TN-580/78] N79-26196
NICKEL COATINGS
Nickel plating, volume 2
[P/539/77/28] N79-26190
Corrosion of nickel deposits in 40% KOH at 180 C, part 1
[P/539/77/31] N79-26191
NICKEL COMPOUNDS
Reduction of silica supported nickel catalysts
N79-26194
Hydrogen electrode and nickel boride alloys
[P/539/77/30] N79-26533
NIGHT
Rocket radio measurement of electron density in the nighttime ionosphere
[NASA-CR-157442] N79-26587
NIOBIUM
Degradation mechanism of Nb3Sn composite wires under tensile strain at 4.2 K
[BNL-24957] N79-26184
NIOBIUM ALLOYS
Properties of superconducting Nb3Si
[BNL-24949] N79-26330
NIOBIUM COMPOUNDS
SLPX: Superconducting long-pulse tokamak experiment --- magnetics system
[PPPL-1488] N79-26947
NITRIC OXIDE
Stability evaluation of ambient concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide contained in compressed gas cylinders
[PB-292749/9] N79-26153
Measurement of NO and O3 from aircraft: 1977 tropical convergence zone experiment
N79-26720
NITROGEN
Raman studies of the orientational motions of small diatomics dissolved in argon, 1; and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite, 2
N79-26122
A pore model for gasification reactions: An application to the system C-CO2-CO-N2
N79-26127
Diffusivity and solubility of nitrogen in multi-component liquid iron alloys containing alloying elements up to 50 wt% at 1600 C
N79-26162
NITROGEN COMPOUNDS
Synthesis of silicon-nitrogen-phosphorus compounds including a new synthesis of phosphazenes
[AD-A067274] N79-26137
Inorganic nitrogen content of precipitation in the lower Alps
N79-26696
NITROGEN DIOXIDE
Stability evaluation of ambient concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide contained in compressed gas cylinders
[PB-292749/9] N79-26153
NOISE POLLUTION
Italian noise legislation: Defects and insufficiencies of present situation
[FUB-18-1978] N79-26550
NOISE PROPAGATION
Propagation of noise in the far field from electric transformers
N79-26293
NOISE REDUCTION
Microphone windscreen performance
[PB-292967/7] N79-26289
Experimental performance measurements of Adaptive Noise Canceller [ANC]: Various inputs and internal parameters correspond with existing theory
[AD-A067977] N79-26325
NOISE SPECTRA
Transient attenuation of power supplies: A theoretical and practical evaluation of a power supply's ability to prevent coupling of transient from mains network into the DC output
[ECR-83] N79-26334
Combustion noise prediction: Entropy/vorticity effects --- in gas turbines
[AD-A067993] N79-26882
NONDESTRUCTIVE TESTS
Flaw evaluation procedures --- inspecting nuclear power plant components
[EPRI-NP-719-SR] N79-26415
Note on non-destructive detection of voids by a high frequency inversion technique
[COO-2482-8] N79-26416
NONLINEAR EQUATIONS
Computational experiments with systems of nonlinear equations
N79-26841
Relationship between Dirac and matrix Schroedinger inverse scattering transforms
[PM/78/6] N79-26854
On the existence of solutions of nonlinear Volterra equations in abstract spaces
[HTKK-MAT-A120/1978] N79-26855
Landesman-Lazar type problems for nonlinear equations
N79-26856
On the boundary value problem u second derivative + u = 1/alpha u + p[t] u[0] = 0 = n [pi0
N79-26857
Nonlinear waves as particles
N79-26880
NONLINEAR FILTERS
Simultaneous quantum mechanical observations and nonlinear quantum stochastic filter
N79-26877
NONLINEAR SYSTEMS
Nonlinear system analysis in bipolar integrated circuits
N79-26296
Contour measurement system
[NASA-CASE-MFS-23726-1] N79-26439
Estimator performance for a class of nonlinear estimation problems
[AD-A067661] N79-26870
Study of improved modeling and solution procedures for nonlinear analysis --- aircraft-like structures
[NASA-CR-158750] N79-26875
NONLINEARITY
Some new results in the second-order theory of nonlinear thermoelasticity
N79-26426
NONUNIFORM PLASMAS
Experimental observation of strong profile modification of an inhomogeneous plasma due to intense microwaves
N79-26941
NORMAL DENSITY FUNCTIONS
Contribution to the theory of [N,M]-compact, paracompact and normal spaces
N79-26878
NORMALIZING [STATISTICS]
Renormalization group transformations for 7-spin triangular lattice
N79-26969
NOTCH SENSITIVITY
Effects of truncation of a predominantly compression load spectrum on the life of a notched graphite/epoxy laminate
[NASA-TM-80114] N79-26427
NOZZLE FLOW
Computer programs for calculating two-dimensional potential flow through deflected nozzles
[NASA-TM-79144] N79-26019
Performance of low thrust attitude control engines. Part 1: Nozzle flow and performance prediction
[TUM-LRT-TB-77/5-PT-1] N79-26113
An evaluation of nozzle response to transient disturbances
N79-26355
NOZZLE GEOMETRY
Computer programs for calculating two-dimensional potential flow through deflected nozzles
[NASA-TM-79144] N79-26019
NUCLEAR DEVICES
Large volume multiple path nuclear pumped laser
[NASA-CASE-LAR-12592-1] N79-26385
NUCLEAR EXPLOSIONS
WEDCOM 4: A FORTRAN code for the calculation of ELF, VLF, and LF propagation in a nuclear environment. Volume 3: Computational models
[AD-A066977] N79-26260
NUCLEAR FUELS
Analytical methodology and facility description spent fuel policy
[DOE/ET-0054] N79-26917
NUCLEAR FUSION
Effects of suprathermal fusion particles in Tokamak plasmas
N79-26939
Department of Energy policy for fusion energy
[DOE/ER-0018] N79-26952
Fusion power program
[ANL/FPP-78-2] N79-26953
NUCLEAR MAGNETIC RESONANCE
Design of rf power amplifiers [high and low Q] and lumped equivalent circuits of transmission lines with NMR applications
[IS-4596] N79-26329
Development of practical MO techniques for prediction of the properties and behavior of materials --- oxazoles and imidazoles
[AD-A067068] N79-26892
NMR of dilute ortho-H[sub]2 impurities in solid para-H[sub]2 at temperatures below 1K
N79-26972
NUCLEAR POTENTIAL
Information on nucleon-nucleon interaction from nuclear matter calculations
[ISS-P-78/12] N79-26921
NUCLEAR POWER PLANTS
Flaw evaluation procedures --- inspecting nuclear power plant components
[EPRI-NP-719-SR] N79-26415
Use of waste heat from nuclear power plants
[CONF-7811109-4] N79-26527
NUCLEAR REACTIONS
Validity of the factorized DWIA in e, e1p reactions
[ISS-P-78/8] N79-26899
NUCLEAR REACTORS
A summary of the regional tectonics and seismicity of eastern Kansas; summary of project activities and results to the end of the second year, or September 10, 1979
[PB-293661/5] N79-26610
NUCLEAR RESEARCH
Fusion power program
[ANL/FPP-78-2] N79-26953
Numerical software support for the fusion energy program at Oak Ridge
[CONF-780763-1] N79-26955
NUCLEI [NUCLEAR PHYSICS]
Symmetries and statistical behavior in fermion systems
[COO-2171-184] N79-26895
Hadron-nucleus inclusive data from Fermilab
[COO-3065-210] N79-26912
NUCLEON-NUCLEON INTERACTIONS
Information on nucleon-nucleon interaction from nuclear matter calculations
[ISS-P-78/12] N79-26921
NUCLEON-NUCLEON SCATTERING
Implications of nucleon-nuclear spin-polarization measurements
[ANL-HEP-CP-78-48] N79-26915
NUCLEONICS
Symmetries and statistical behavior in fermion systems
[COO-2171-184] N79-26895
NUMERICAL ANALYSIS
Numerical solutions of underwater acoustic wave propagation problems
[AD-A067023] N79-26887

NUMERICAL CONTROL
Experimental studies of coherent anti-Stokes Raman spectroscopy in liquids
N79-26123
NUMERICAL FLOW VISUALIZATION
Numerical solution of a steady, viscous, axisymmetric cavity-flow problem
[NPL-DNACS-12/79] N79-26368
NUMERICAL INTEGRATION
ARIS manual
[AD-A067830] N79-26139
NUMERICAL WEATHER FORECASTING
A study of conditional instability of the second kind and a numerical simulation of the intertropical convergence zone and easterly waves
N79-26583
A report on objective weather forecasting methods of the central Institute of Meteorology and Geodynamics, with special consideration of the Model Output Statistics [MOS] method
N79-26636
Cloudiness situation in the Alpine region under various weather conditions
N79-26662
Fine-mesh numerical forecasting in Switzerland
N79-26667
Spectral presentation of errors of numerical weather forecast
N79-26669
Inclusion of the orographic error in the numerical forecast model
N79-26671
Numerical simulation of river icing, depending on meteorological parameters, using the Loisach in upper Bavaria as an example
N79-26709
Objective classification of daily 500 mbar patterns
[KNMI-WR-78-8] N79-26737

O

OCEAN BOTTOM
Geotechnical aspects of subsurface seabed disposal of high level radioactive wastes --- core sampling
[COO-4069-1] N79-26918
Relief of the Ocean floor and the new global tectonics
N79-27067
OCEAN CURRENTS
Satellite oceanography of eastern boundary currents and its implications to ASW
[AD-A067259] N79-26754
Gravity wave propagation in the presence of a current with an arbitrary vertical profile
[PB-293806/6] N79-26758
OCEAN DATA ACQUISITIONS SYSTEMS
Air Deployed Oceanographic Mooring [ADOM]
[AD-A068001] N79-26755
OCEAN MODELS
Potential marine pollution from the Cavtat shipwreck
N79-26549
OCEAN SURFACE
Atlas of infrared imagery of the sea surface
[AD-A067731] N79-26756
OCEAN THERMAL ENERGY CONVERSION
Data from the Atlantic Oceanographic and Meteorological Laboratories OTEC plant site study in the Gulf of Mexico, July 1977
[PB-293733/2] N79-26759
OCEANOGRAPHY
Satellite oceanography of eastern boundary currents and its implications to ASW
[AD-A067259] N79-26754
Commercial digital/ADP equipment in an ocean environment. Volume 1: Performance study
[AD-A067662] N79-26796
OCEANS
Seabed disposal program, volume 1
[SAND-78-1359] N79-26909
OFFSHORE ENERGY SOURCES
Data from the Atlantic Oceanographic and Meteorological Laboratories OTEC plant site study in the Gulf of Mexico, July 1977
[PB-293733/2] N79-26759
OIL EXPLORATION
Compendium reports on oil shale technology
[PB-293279/6] N79-26237
OIL POLLUTION
Research summary--oil spills
[PB-293597/1] N79-26558
OIL SLICKS
Research summary--oil spills
[PB-293597/1] N79-26558
ON-LINE PROGRAMMING
A primer for MLAB: An on-line modelling laboratory
[PB-292895/0] N79-26822
OPERATING SYSTEMS [COMPUTERS]
The implementation and evaluation of parallel algorithms on C.mmp
N79-26801
An automated software maintence tool for large-scale operating systems
[AD-A067799] N79-26813
OPERATIONS RESEARCH
Operational activities
N79-26717
OPTICAL COMMUNICATION
Blue-green filter technology
[AD-A067789] N79-26931
Characterization of optical fibers and design criteria of communication systems
[FUB-14-1978] N79-26935
OPTICAL CORRECTION PROCEDURE
Correction of phase distortion by nonlinear optical techniques
[AD-A066148] N79-26386
OPTICAL COUNTERMEASURES
Preliminary airworthiness evaluation AH-1S helicopter equipped with a Garrett infrared radiation suppressor and an AN/ALQ-144 jammer
[AD-A067757] N79-26047
Advanced multidither coat studies
[AD-A068005] N79-26932
OPTICAL DATA PROCESSING
Frequency-variant optical signal processing
N79-26928
OPTICAL EQUIPMENT
Evaluation of the effects of solar radiation on glass --- space environment simulation
[NASA-CR-161247] N79-26209
Optical instrument for in-stack monitoring of particle size
[PB-292751/5] N79-26561
OPTICAL FILTERS
Blue-green filter technology
[AD-A067789] N79-26931
OPTICAL MEASUREMENT
Measurements methods applied to satellite geodesy: Basic Theory
[TUM-MITT-145] N79-26105
Fluorescence measurements on a minidisc centrifugal analyzer with a pulsed nitrogen laser source
N79-26125
Analysis of flat mirror V-trough solar concentrator
N79-26472
OPTICAL PROPERTIES
The properties of indium gallium antimonide thin films deposited by multitarget rf sputtering
N79-26155
Optical quality of tilted spherical mirror unstable resonators
[AD-A068015] N79-26394
The optical properties of smoke-protective devices
[FAA-AM-78-41] N79-26784
OPTICAL RADAR
Feasibility study of satellite-borne lidar global wind monitoring system
[PB-293879/3] N79-26746
OPTICAL SCANNERS
Scanner development
[AD-A066902] N79-26390
OPTIMIZATION
Prototype development of an optimized, tapered-thickness, graphite/epoxy composite flywheel
[UCRL-52623] N79-26121
Combustion optimization studies for stratified charge and diesel engines
[COO-4191-1] N79-26149
Multiparametric optimization of four-bar and six-bar linkages
N79-26238
NEWSUMT: A FORTRAN program for inequality constrained function minimization, users guide
[NASA-CR-159070] N79-26811
Simulation of an information system with a distributed architecture
[FUB-34-1977] N79-26819
The design and implementation of software for unconstrained optimization
[NPL-DNACS-8/78] N79-26820
Planning and control of software based systems
[RSRE-78012] N79-26825
Future requirements and present perspectives in data handling for high energy physics experiments
[ISS-T-78/5] N79-26920
Integrated systems: A modern trend in the development of automated design systems
N79-27065
Principles of the construction of a new generation of SAPR's
N79-27066
ORBIT CALCULATION
A fast method for determining the mean orbital elements of an earth satellite
[REPT-3-78] N79-26099
ORBITAL ELEMENTS
A fast method for determining the mean orbital elements of an earth satellite
[REPT-3-78] N79-26099
ORBITAL MECHANICS
Flight Mechanics/Estimation Theory Symposium --- with application to autonomous navigation and attitude/orbit determination
[NASA-CP-2082] N79-26082
SIRIO: One year of station keeping
N79-26098
ORBITAL POSITION ESTIMATION
Flight Mechanics/Estimation Theory Symposium --- with application to autonomous navigation and attitude/orbit determination
[NASA-CP-2082] N79-26082
Orbit/attitude estimation with LANDSAT Landmark data
N79-26086
Multiple scene attitude estimator performance for LANDSAT-1
N79-26087
Autonomous attitude estimation via star sensing and pattern recognition
N79-26088
Shoe-box orbit determination system for SMM preliminary results
N79-26092
On-board orbit determination for application satellites
N79-26093
Relativistic information of the GPS-NAVSTAR position determination algorithm
N79-26095
Short-term solar pressure effect and GM uncertainty on TDRS orbital accuracy: A study of the interaction of modeling error with tracking and orbit determination
N79-26096
SIRIO: One year of station keeping
N79-26098
ORDER-DISORDER TRANSFORMATIONS
Renormalization group transformations for 7-spin triangular lattice
N79-26969
OREGON
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL] --- Oregon
[E79-10220] N79-26447
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
ORGANIC COMPOUNDS
Formation and transformation of polycyclic organic matter from coal combustion
[COO-4347-1] N79-26145
Preliminary thoughts on proxy PNA
[CONF-781150-5] N79-26148
The NRL program on electroactive polymers
[AD-A067736] N79-26213
Fate of metal ions during domestic treatment of water containing organics
[PB-293147/5] N79-27034
ORGANIC MATERIALS
The decomposition of polycyclic organic matter adsorbed on coal fly ash
N79-26119
ORGANOMETALLIC COMPOUNDS
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
[LBL-8294] N79-26142
The NRL program on electroactive polymers
[AD-A067736] N79-26213
OROGRAPHY
The experimentation of a baroclinic model with 5 levels in the south-eastern Europe, including the orography effect
N79-26663
Modifications of the surface frontogenesis, associated with simple orography in an isentropic model
N79-26666
Inclusion of the orographic error in the numerical forecast model
N79-26671
Contribution of orography, thermal wind, and transient eddies to quasistationary waves
N79-26676
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation
N79-26698
ORTHO HYDROGEN
NMR of dilute ortho-H[sub]2 impurities in solid para-H[sub]2 at temperatures below 1K
N79-26972
ORTHOGONAL FUNCTIONS
Computational experiments with systems of nonlinear equations
N79-26841
OSCILLATORS
The elastic-plastic dangling spider problem
N79-26835
OUTGASSING
NASA workshop on outgassing
N79-26078
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Research Association
N79-26079
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Res. Association
N79-26080

OUTPUT
Output capacity of the stored program control [SPC] commutation system
[FUB-35-1977] N79-26271
OVERVOLTAGE
Oxygen overvoltage on nickel and the 50-50 Ni-Fe alloy in 40% KOH at 80 C. Role of oxide films
[P/539/77/13] N79-26189
OXIDATION
The kinetics of the oxidation of graphite by an impinging jet of gas
[NRC/CNR-TT-1938] N79-26172
Silicon oxide studies: Physical modeling and device applications of thermal oxidation of heavily doped silicon
N79-26300
OXIDATION RESISTANCE
Thermal fatigue of oxidation resistant overlay coatings for superalloys
N79-26156
OXIDATION-REDUCTION REACTIONS
Electrochemical cell for rebalancing REDOX flow system
[NASA-CASE-LEW-13150-1] N79-26474
Recent advances in redox flow cell storage systems
[NASA-TM-79186] N79-26505
OXIDE FILMS
Oxygen overvoltage on nickel and the 50-50 Ni-Fe alloy in 40% KOH at 80 C. Role of oxide films
[P/539/77/13] N79-26189
OXIDES
Interband transitions of semiconducting oxides determined from photoelectrolysis spectra
[AD-A066188] N79-26982
OXIDIZERS
Oxidant formulation in the generation of ozone
[PB-293269/7] N79-26571
OXYGEN
Raman studies of the orientational motions of small diatomics dissolved in argon, 1; and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite, 2
N79-26122
Development of combustion data to utilize low-Btu gases as industrial process fuels
[FE-2489-30] N79-26143
A study of metal-oxygen solid solutions utilizing solid electrolytic cells
N79-26160
Thermodynamic and kinetic investigations of liquid metal-oxygen systems using solid state electrochemical methods
N79-26171
Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method --- temperature dependence
[NRC/CNR-TT-1942] N79-26173
Crossed molecular beam study of the reactions of oxygen and fluorine atoms
[AD-A067848] N79-26894
OXYGEN TENSION
Oxygen partial pressure: A key to alloying and discovery in metal oxide-metal eutectic systems
[CONF-781172-1] N79-26182
OZONE
Oxidant formulation in the generation of ozone
[PB-293269/7] N79-26571
Association between meteorological conditions and high ozone and sulfate concentrations: A 1974 episode in the Eastern United States
[PB-293485/9] N79-26611
Daily variation of near-surface ozone at mountain stations
N79-26642
Measurement of NO and O3 from aircraft: 1977 tropical convergence zone experiment
N79-26720
Intertropical convergence zone ozone profiles from the Learjet ozone analyzer
N79-26723
Balloon-borne ECC ozonesonde data, appendix A
N79-26729

P

PACIFIC NORTHWEST [US]
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL] --- Oregon
[E79-10220] N79-26447
PACIFIC OCEAN
Climatology in French Polynesia
[MN-MONO-107] N79-26621
PACKING DENSITY
The design of a high packing density PCM magnetic tape replay system
[RAE-TR-77140] N79-26378
PALEOMAGNETISM
Paleoclimate of the Nendaz region. New interpretation of the post-wurmian warming
N79-26657
PALLADIUM
Morphology and sintering of platinum, palladium, rhodium and platinum-alloys on SiO2 and graphite
N79-26168
PANAMA
Airborne pressure and temperature measurements during the 1977 intertropical convergence zone experiment
N79-26727
PANAMA CANAL ZONE
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment
N79-26722
Preliminary results from the University of Denver infrared spectrometer - 1977 intertropical convergence zone experiment
N79-26724
Stratospheric aerosols in the intertropical convergence zone, Panama Canal zone
N79-26725
Balloon-borne ECC ozonesonde data, appendix A
N79-26729
PARA HYDROGEN
NMR of dilute ortho-H[sub]2 impurities in solid para-H[sub] 2 at temperatures below 1K
N79-26972
PARACHUTES
Parachutes and decelerators, volume 2. A bibliography with abstracts
[NTIS/PS-79/0368/5] N79-26033
PARALLEL PLATES
Source excitation of an open, parallel-plate waveguide. Numerical results
[AD-A067787] N79-26323
PARALLEL PROCESSING [COMPUTERS]
Future requirements and present perspectives in data handling for high energy physics experiments
[ISS-T-78/5] N79-26920
PARALLEL PROGRAMMING
The implementation and evaluation of parallel algorithms on C.mmp
N79-26801
PARAMETERIZATION
An accurate reliability modeling technique for hybrid modular redundant digital systems using modular characteristic error parameters
N79-26413
PARAMETRIC AMPLIFIERS
Computer-aided design of microwave integrated parametric amplifiers
N79-26306
PARTIAL DIFFERENTIAL EQUATIONS
Landesman-Lazar type problems for nonlinear equations
N79-26856
PARTIAL PRESSURE
Oxygen partial pressure: A key to alloying and discovery in metal oxide-metal eutectic systems
[CONF-781172-1] N79-26182
PARTICLE ACCELERATION
Particle acceleration in pulsar magnetospheres
N79-27048
PARTICLE ACCELERATORS
Harmony in science: Superconductivity and high energy physics
[SLAC-PUB-2237] N79-26905
PARTICLE DENSITY [CONCENTRATION]
Experimental measurements of the behavior of non dilute particle suspensions in turbulent flow
N79-26353
PARTICLE DIFFUSION
Thin-source concentration dependent diffusion --- using isotopic labeling for measuring the diffusion of calcium cations in sodium chloride
N79-26966
PARTICLE INTERACTIONS
Validity of the factorized DWIA in e, e1p reactions
[ISS-P-78/8] N79-26899
Realistic interactions and variational calculations of the ground state properties of three body systems on a harmonic oscillator basis
[ISS-P-78/10] N79-26900
Electrodisintegration of few-body systems and realistic interactions
[ISS-P-78/11] N79-26901
PARTICLE MOTION
Evaluation of surface properties in SPAR electrophoresis --- laxtex coatings and particle motion
[NASA-CR-161248] N79-26136
PARTICLE PRODUCTION
Hadron production in high energy muon scattering
N79-26903
Hadron-nucleus inclusive data from Fermilab
[COO-3065-210] N79-26912
PARTICLE SIZE DISTRIBUTION
Optical instrument for in-stack monitoring of particle size
[PB-292751/5] N79-26361
Stratospheric aerosols in the intertropical convergence zone, Panama Canal zone
N79-26725
PARTICLE SPIN
Implications of nucleon-nuclear spin-polarization measurements
[ANL-HEP-CP-78-48] N79-26915
PARTICLES
Characterization of fly ash from coal combustion
[COO-4347-4] N79-26547
Chemical composition of exhaust particles from gas turbine engines
[PB-292380/3] N79-26563
Air quality data for metals 1975 from the National Air Surveillance network
[PB-293106/1] N79-26570
PARTICULATE SAMPLING
Proceedings: Advances in Particles Sampling and Measurement
[PB-293363/8] N79-26581
PATENT POLICY
Technology assessment and forecast report
[PB-293380/2] N79-27030
PATTERN METHOD [FORECASTING]
Objective classification of daily 500 mbar patterns
[KNMI-WR-78-8] N79-26737
PATTERN RECOGNITION
Autonomous attitude estimation via star sensing and pattern recognition
N79-26088
Large Area Crop Inventory Experiment [LACIE]. Signature extension in remote sensing
[E79-10219] N79-26446
Modem identification experiments
[AD-A067538] N79-26829
Evaluation of the two-dimensional Fourier transform applied to acoustic image pattern measurements
[AD-A068017] N79-26888
PATTERN REGISTRATION
A digital scene matching technique for geometric image correction and autonomous navigation
N79-26085
Orbit/attitude estimation with LANDSAT Landmark data
N79-26086
PAVEMENTS
Performance study of continuously reinforced concrete pavement on I-95
[PB-292930/5] N79-26241
Continuously reinforced concrete overlays on existing Portland cement concrete pavements
[PB 293043/6] N79-26242
Structural design of flexible pavement. Part 1: Summary of performance
[PB-292787/9] N79-26245
Structural design of flexible pavement. Part 3: Analysis of performance study data
[PB-292838/0] N79-26246
Analysis of rigid pavement on viscoelastic foundation subjected to moving loads
N79-26422
PAYLOAD DELIVERY [STS]
An impedance technique for determining low-frequency payload environments
[NASA-CR-3143] N79-26428
PAYLOADS
Transfer trajectory design for a shuttle launched geosynchronous payload
N79-26097
PERFORMANCE PREDICTION
Performance of low thrust attitude control engines. Part 1: Nozzle flow and performance prediction
[TUM-LRT-TB-77/5-PT-1] N79-26113
A simulation study of Large Area Crop Inventory Experiment [LACIE] technology
[E79-10216] N79-26443
Performance prediction of computer architectures operating on linear mathematical models
N79-26789
PERFORMANCE TESTS
Performance and heat transfer of high energy rocket engines with thrust variation
[ILR-21] N79-26111
Microphone windscreen performance
[PB-292967/7] N79-26289
Electrical characterization of standard and radiation-hardened RCA CDP1856D 4-BIT, CMOS, bus buffer/separator
[NASA-CR-158725] N79-26314
Electrical characterization of Hughes HCMP 1853D and RCA CDP1853D N-bit, CMOS, 1-of-8 decoder microcircuits
[HAC-REF-E0963] N79-26315
Performance of a 14.9-kW laminated-frame dc series motor with chopper controller
[NASA-TM-79177] N79-26316
Pressurized water electrolysis test circuit: Initial operating results
[P/539/77/12] N79-26335
Rankine-cycle component characteristics
N79-26478
Level 1 environmental assessment performance evaluation
[PB-292931/3] N79-26564
Low-power baseline test results for the GPU 3 Stirling engine
[NASA-TM-79103] N79-27023

PERIODIC VARIATIONS
Probability of the mean sum of monthly precipitation in the Austrian Alps
N79-26691
Spatial and temporal fluctuations of precipitations within an intra-Alpine area as function of general atmospheric circulation [examples taken in Savoy]
N79-26692
Spatial and temporal variations of the isotopic composition of precipitations at the Alps periphery
N79-26695

PERIPHERAL EQUIPMENT [COMPUTERS]
Computer sciences and technology: Computer peripheral memory system forecast
[PB-294148/2] N79-26799

PERSHING MISSILE
Gyrocompassing error analysis for Pershing 2 inertial measurement unit
[AD-A067516] N79-26375

PERT
A user's guide for TAC PERT
[AD-A068012] N79-27005

PERTURBATION
A singular perturbation approach to power system dynamics
N79-26294

PERTURBATION THEORY
Inertial perturbations to inertialess magnetohydrodynamic and rotating flows
N79-26342
A perturbation method for the periodic solutions of a discontinuous system of differential equations
N79-26837
Multimodeling and multiparameter singular perturbation in control and game theory
N79-26873
Information on nucleon-nucleon interaction from nuclear matter calculations
[ISS-P-78/12] N79-26921

PETRI NETS
Performance prediction of computer architectures operating on linear mathematical models
N79-26789

PHASE TRANSFORMATIONS
Solidification behavior of type 308 stainless steel filler metal
[ORNL-TM-6644] N79-26179
Mathematical programming solution to the phase problem of crystallography
N79-26970
Electronically induced phase transformations --- in rare earth superdonducting compounds
[AD-A067066] N79-26983

PHASED ARRAYS
On the development of strong-motion instrument networks in the United States
[PB-293579/9] N79-26612

PHENOLOGY
Table-maps as a method of representing data on climate of mountainous regions with examples from Norwegian phenology and of precipitation distribution over the eastern Alps
N79-26658

PHOSPHORUS
Estimates of the annual loading of total phosphorus to Lake Champlain
[PB-293435/4] N79-26459
Suitability of input-output models for evaluating the impact of phosphorous loadings to Lake Champlain
[PB-293442/0] N79-26464
Evaluation of aluminum sulfate for phosphorus control in eutrophic lakes
[PB-292989/1] N79-26556
Chemical technology and economics in environmental perspective. Task 1: Analysis of the sources of phosphorus in the environment
[PB-293376/0] N79-26568

PHOSPHORUS COMPOUNDS
Synthesis of silicon-nitrogen-phosphorus compounds including a new synthesis of phosphazenes
[AD-A067274] N79-26137

PHOTOCHEMICAL REACTIONS
Formation and transformation of polycyclic organic matter from coal combustion
[COO-4347-1] N79-26145
Photochemistry and enzymology of photosynthesis
[COO-3326-70] N79-26763
Interband transitions of semiconducting oxides determined from photoelectrolysis spectra
[AD-A066188] N79-26982

PHOTODECOMPOSITION
Photodegradation and biodegradation of some polymers containing carbonyl groups
N79-26201

PHOTODIODES
Fabrication and testing of a sensitive ultraviolet-visible silicon photodiode device
N79-26370

PHOTODISSOCIATION
Photodissociation cross sections and spectroscopy of atmospheric positive ions
[AD-A067186] N79-26592

PHOTOGRAPHIC PLATES
The UK 1.2m Schmidt telescope and the southern sky survey. Part 2: Photographic techniques
[ROE-OR-4-PT-2] N79-27046

PHOTOGRAPHIC RECORDING
An automatic portable telecine camera
[RAE-TM-IT-177] N79-26379

PHOTOMULTIPLIER TUBES
A dynamic crossed-field photomultiplier with an electron bombarded semiconductor collector
N79-26307
Preliminary studies of microchannel plate photomultiplier tube neutron detectors for flight test applications
[SAND-78-8266] N79-26332

PHOTON-ELECTRON INTERACTION
Transient radiation and dose-enhancement effects in transistors
[AD-A067629] N79-26313

PHOTONS
Low cost solar array project: Composition measurements by analytical photon catalysis
[NASA-CR-158737] N79-26500
Laser assisted semiconductor device processing --- energy transfer, thermal properties, and photon absorption
[AD-A067183] N79-26988

PHOTOSYNTHESIS
Fuels from solar energy: Photosynthetic systems: State of the art and potential for energy production
[COO-4151-2] N79-26230
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578
Photochemistry and enzymology of photosynthesis
[COO-3326-70] N79-26763

PHOTOVOLTAIC CELLS
Method of construction of a multi-cell solar array
[NASA-CASE-MFS-23540-1] N79-26475
Measurement techniques and instruments suitable for life-prediction testing of photovoltaic arrays
[NASA-CR-158733] N79-26486
Combined photovoltaic and thermal hybrid collector systems
[COO-4577-3] N79-26525

PHYSICAL CHEMISTRY
Doping process in silicon epitaxy: Transfer function and physicochemical model
N79-26976

PHYSIOLOGICAL EFFECTS
Physiological effects of a high soybean protein diet in man
N79-26777

PHYSIOLOGICAL TESTS
Results of a 64Cu-loading test applied to patients with an inherited defect in their Cu-metabolism [Menkes' disease]
[IRI-133-77-04] N79-26774
The oral 64Cu-loading test: Applications and problems
[IRI-133-78-02] N79-26775

PIEZOELECTRIC CRYSTALS
Band and polarization calculations for ferro-electric and piezoelectric crystals
N79-26964

PILOT PERFORMANCE
Air Force female pilots program: Initial performance and attitudes
[AD-A065641] N79-26783

PIONS
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898

PIPE FLOW
Initiation and propagation of normal zones in a force-cooled tubular superconductor
[LA-UR-78-2481] N79-26331

PIPES [TUBES]
Development of a glass polymer composite sewer pipe from waste glass
[BNL-50886] N79-26215
Prediction of flow and heat transfer in internally finned tubes
N79-26343
Local and average heat transfer characteristics for turbulent air flow in an asymmetrically heated tube
N79-26357
Data reduction in the eddy current testing of condenser tubes
[TDB-314] N79-26417

PISTON ENGINES
Stirling engine characteristics
N79-26480

PITTING
The effect of environmental variables on the pitting corrosion behavior of single and duplex phase 304L stainless steel
N79-26157

PLAINS
Mountain winds in the plains
N79-26645

PLANETARY RADIATION
Variability of Lyman-alpha emission from Jupiter
[NASA-CR-158756] N79-27045

PLANKTON
Distribution of phytoplankton in Arkansas lakes
[PB-292742/4] N79-26768

PLANNING
Planning and control of software based systems
[RSRE-78012] N79-26825

PLASMA CONDUCTIVITY
Resistive ballooning mode equation
[ORNL-TM-6629] N79-26954

PLASMA DENSITY
Basic physical phenomena neutron production and scaling of the dense plasma focus
[IPF-77-7] N79-26961

PLASMA DIAGNOSTICS
Plasma neutron diagnostic techniques with good spatial and energy resolution
[UCRL-81120] N79-26956

PLASMA GENERATORS
Temperature measurements in the TORMAC 4-c plasma
[LBL-8166] N79-26959

PLASMA HEATING
Doublet demonstration fusion power reactor study
[GA-A-14742] N79-26946
Negative ion based neutral beams for plasma heating
[BNL-24782] N79-26951
Alpha heating in toroidal devices
[COO-2218-123] N79-26957

PLASMA JETS
Characterization of a Fabry-Perot interferometer and a dc arc plasma jet for spectrochemical analysis
[IS-T-815] N79-26144

PLASMA LAYERS
A fluid description of plasma double-layers
[NASA-CR-158719] N79-26942

PLASMA PHYSICS
Modeling of the geosynchronous orbit plasma environment. Part 3: ATS-5 and ATS-6 pictorial data atlas
[AD-A067843] N79-26597
Physical processes in directed ion beam sputtering
[NASA-CR-159567] N79-26943
Basic physical phenomena neutron production and scaling of the dense plasma focus
[IPF-77-7] N79-26961

PLASMA RADIATION
Stimulated Brillouin sidescatter and backscatter of carbon dioxide laser radiation from a laser altered arc plasma
N79-26937

PLASMA TEMPERATURE
Temperature measurements in the TORMAC 4-c plasma
[LBL-8166] N79-26959

PLASMA WAVES
Destruction of cyclotron resonances in weakly collisional, inhomogeneous plasmas
[AD-A067827] N79-26596
Harmonic generation and parametric excitation in a beam-plasma system
N79-26938

PLASMA-ELECTROMAGNETIC INTERACTION
Stability of the critical surface in the presence of strong electromagnetic radiation
N79-26940
Experimental observation of strong profile modification of an inhomogeneous plasma due to intense microwaves
N79-26941
Laser fusion: Status, future, and tritium control
[UCRL-81946] N79-26950

PLASMA-PARTICLE INTERACTIONS
Effects of suprathermal fusion particles in Tokamak plasmas
N79-26939

PLASMAS [PHYSICS]
Theory of thermionic energy converter with variable plasma electron temperature
[COO-2533-10] N79-26521
Collective radio-emission from plasmas
[AD-A066923] N79-26944
Atomic reaction rates in H[-] and D[-] plasmas
[UCID-18031] N79-26948

PLATES [STRUCTURAL MEMBERS]
Experiments heat transfer and pressure drop for an array of colinear interrupted plates
N79-26358

PLATING
Plated copper substrates for the LASL Antares CO2 laser system --- mirror design
[LA-UR-79-9] N79-26397

PLATINUM
Morphology and sintering of platinum, palladium, rhodium and platinum-alloys on SiO2 and graphite
N79-26168
Thermodynamic characterization of liquid metals at high temperature by isobaric expansion measurements --- platinum
[UCRL-80114] N79-27000

PLAYBACKS
The design of a high packing density PCM magnetic tape replay system
[RAE-TR-77140] N79-26378

PLUG NOZZLES
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles. comprehensive data report, volume 1
[NASA-CR-159575-VOL-1] N79-26884
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 2
[NASA-CR-159575-VOL-2] N79-26885
acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 3
[NASA-CR-159575-VOL-3] N79-26886

PLUTONIUM ALLOYS
Stabilization of the plutonium delta phase in the plutonium-gallium-zirconium ternary phase equilibria system
N79-26167

PLUTONIUM OXIDES
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7651-PR] N79-26910

PNEUMATICS
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919

PODS [EXTERNAL STORES]
Boeing 747 aircraft with large external pod for transporting outsize cargo
[NASA-CR-159067] N79-26063

POINTING CONTROL SYSTEMS
Magnetic suspension and pointing system --- on a carrier vehicle
[NASA-CASE-LAR-11889-1] N79-26372

POISSON DENSITY FUNCTIONS
Note on a time dependent queue M/D/1 with input equal to service rate
[RAE-TM-MATH-COMP-7807] N79-26832
Spectral estimation using Poisson distributed time series data with time quantization
[AD-A067324] N79-26867
Minimax subset selection for the multinomial and Poisson distributions
[AD-A067187] N79-26868

POISSON EQUATION
The solution of two dimensional problems in astrophysics
N79-27047

POLAND
The changes of the atmospheric circulation indices over the Polish West Carpathians during the last 27 years
N79-26627

POLARIZATION [CHARGE SEPARATION]
Implications of nucleon-nuclear spin-polarization measurements
[ANL-HEP-CP-78-48] N79-26915

POLARIZATION CHARACTERISTICS
Band and polarization calculations for ferro-electric and piezoelectric crystals
N79-26964
Airborne infrared and submillimeter astronomical polarization measurements at different wavelengths --- C-141 observations
[NASA-CR-158751] N79-27044

POLARIZED ELECTROMAGNETIC RADIATION
Gravitational time delay in orthogonally polarized radiation passing by the sun
[NASA-CR-158757] N79-27049

POLICIES
Earth information from space by remote sensing
[PB-292736/6] N79-26454
Institutional arrangements for effective water management in Colorado
[PB-293647/4] N79-26466
Analytical methodology and facility description spent fuel policy
[DOE/ET-0054] N79-26917

POLLUTION CONTROL
Fuel contaminants. Volume 3: Control of coal-related pollutants
[PB-293328/1] N79-26234
Automotive fuel economy and emissions experimental data
[PB-293580/7] N79-26412
Control of sulfur dioxide and particulate emission in MHD power systems using high sulfur coal
[CONF-781109-18] N79-26546
Proceedings: Third Workshop on catalytic combustion
[PB-293336/4] N79-26548
Assessment of the use of fugitive emission control devices
[PB-292748/1] N79-26551
Characterization of the EPA/IERL-RTP pilot-scale precipitation
[PB-292820/8] N79-26555
Evaluation of aluminum sulfate for phosphorus control in eutrophic lakes
[PB-292989/1] N79-26556
Research summary--oil spills
[PB-293597/1] N79-26558
Preliminary environmental assessment of the lignite-fired CAFB
[PB-293225/9] N79-26569
Disposal of by-products from nonregenerable flue gas desulfurization systems
[PB-293163/2] N79-26575
Proceedings: Advances in Particles Sampling and Measurement
[PB-293363/8] N79-26581

POLLUTION MONITORING
Fuel motion and pollutant formation in stratified charge combustion
[UCRL-81155] N79-26150
Estimates of the annual loading of total phosphorus to Lake Champlain
[PB-293435/4] N79-26459
Detection and measurements of air pollutants and constituents by millimeter-wave microwave spectroscopy
[LBL-7986] N79-26544
Regulatory water quality monitoring. A systems perspective
[PB-292756/4] N79-26552
Optical instrument for in-stack monitoring of particle size
[PB-292751/5] N79-26561
Air quality data for metals 1975 from the National Air Surveillance network
[PB-293106/1] N79-26570
Washington state air monitoring data for 1977
[PB-293085/7] N79-26573

POLYCRYSTALS
Continuous Czochralski growth. Silicon sheet growth development of the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158730] N79-26496

POLYESTERS
Photodegradation and biodegradation of some polymers containing carbonyl groups
N79-26201
Synthesis of polyesters containing tetrathiafulvalene groups in the backbone
[AD-A066972] N79-26210

POLYETHYLENES
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208
Polyethylene deformation analysis
N79-26425

POLYIMIDES
Deposition of aluminum-copper alloy on laminated polyimide substrates from an RF induction source
[BDX-613-1993-REV] N79-26186

POLYMER PHYSICS
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208

POLYMERIC FILMS
Ellipsometry as a tool to study the adsorption behavior of synthetic and biopolymers at the air-water interface
N79-26217

POLYMERS
Scattering studies from polymer blends
N79-26202
Analytic models for the treatment of alternant linear heteropolymers
N79-26203
Characterization and effects of molecular orientation in amorphous polymers
N79-26204
The NRL program on electroactive polymers
[AD-A067736] N79-26213
Development of a glass polymer composite sewer pipe from waste glass
[BNL-50886] N79-26215
A study of an electrodeless glow discharge as a means of modifying the surface of polymers
[PB-293570/8] N79-26220

POLYNOMIALS
Expansions in series of Chebyshev polynomials of a function occuring in linear unsteady aerodynamic theory
[RAE-TR-77110] N79-26871

POLYPROPYLENE
Flame retardation of polymers
N79-26205

POLYSTYRENE
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208

POLYVINYL CHLORIDE
Scattering studies from polymer blends
N79-26202

POPULATION INVERSION
Computational study of chemical reaction dynamics at the gas-solid interface
[AD-A067854] N79-26392

POPULATIONS
Draft SCAG-78 growth forecast policy
[PB-293245/7] N79-27032

POROSITY
A pore model for gasification reactions: An application to the system C-CO2-CO-N2
N79-26127

PORTABLE EQUIPMENT
An automatic portable telecine camera
[RAE-TM-IT-177] N79-26379
A hierarchical model of portable input/output
N79-26808

POSITION ERRORS
Short-term solar pressure effect and GM uncertainty on TDRS orbital accuracy: A study of the interaction of modeling error with tracking and orbit determination
N79-26096

POSITIONING
Dynamic analysis and design sensitivity analysis of mechanisms with intermittent motion
N79-26399

POSITIVE IONS
Photodissociation cross sections and spectroscopy of atmospheric positive ions
[AD-A067186] N79-26592

POTASSIUM HYDROXIDES
Thermoplastic materials: Water electrolysis
[P/539/77/06] N79-26152
Corrosion of nickel deposits in 40% KOH at 180 C, part 1
[P/539/77/31] N79-26191
Fe-Cr-Ni stainless steel corrosion in 40% KOH at 150 C and 180 C, part 2
[P/539/77/38] N79-26192

POTENTIAL FLOW
Computer programs for calculating two-dimensional potential flow through deflected nozzles
[NASA-TM-79144] N79-26019
A viscous/potential flow interaction analysis for circulation-controlled airfoils
[AD-A067913] N79-26030
An attempted extension of a finite element solution to axisymmetric potential flow --- galerkin method
[WSRL-0056-TR] N79-26359

POWDER [PARTICLES]
Studies on flame propagation in powdered mixtures
N79-26128

POWER AMPLIFIERS
An investigation of power suck-out in helix traveling-wave tubes
[AD-A067916] N79-26326
Design of rf power amplifiers [high and low Q] and lumped equivalent circuits of transmission lines with NMR applications
[IS-4596] N79-26329

POWER CONDITIONING
A method for correlating performance data of a terrestrial solar cell array
[NASA-TM-79163] N79-26503

POWERED LIFT AIRCRAFT
Fuel-conservative guidance system for powered-lift aircraft
[NASA-TM-78595] N79-26009

PRASEODYMIUM
Energy levels and line intensities for the ground configuration of Pr3+ in LiYF4
[AD-A067845] N79-26140

PREAMPLIFIERS
Low-noise preamplifier for gravitational wave experiments
[LPS-78-11] N79-26339

PRECIPITATION [CHEMISTRY]
Stress corrosion cracking of high strength Al-Zn-Mg-Cu alloys: Matrix precipitation
[RAE-TR-78110] N79-26174

PRECIPITATION [METEOROLOGY]
A stochastic model for an intermittent hydrologic process
N79-26438
Quantitative precipitation measurements by radar in the Ammer Mountains
N79-26624
Table-maps as a method of representing data on climate of mountainous regions with examples from Norwegian phenology and of precipitation distribution over the eastern Alps
N79-26638
Probability of the mean sum of monthly precipitation in the Austrian Alps
N79-26691
Statistical analysis of precipitations in the French Alps
N79-26693
The precipitation in the period from 6-10 October 1977 over the Central Liguria
N79-26694
Spatial and temporal variations of the isotopic composition of precipitations at the Alps periphery
N79-26695
Inorganic nitrogen content of precipitation in the lower Alps
N79-26696
The effect of ground relief upon the extreme values of intensity and duration of precipitation in Belgium. Methods and results
N79-26697
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation
N79-26698
Diagnostic analyses of the GATE A/B scale area at individual time periods
[PB-292961/0] N79-26743

PREDICTION ANALYSIS TECHNIQUES
Comparison of theoretical predicted longitudinal aerodynamic characteristics with full-scale wind tunnel data on the ATLIT airplane
[NASA-CR-158753] N79-26018
Development of linear and nonlinear magnetic circuit models for the prediction of step motor static performance
N79-26297
The prediction of geysering in fluid transfer lines by flooding theory
N79-26346
Combustion noise prediction: Entropy/vorticity effects — in gas turbines
[AD-A067993] N79-26882

PREDICTIONS
Development of practical MO techniques for prediction of the properties and behavior of materials — oxazoles and imidazoles
[AD-A067068] N79-26892
Expected muon spectra at two different latitudes
[KGI-77-2] N79-27058

PRESSURE DISTRIBUTION
Bumblebee program aerodynamic data. Part 3: Pressure fields at Mach numbers 1.5 to 2.0 — for supersonic guided missiles
[NASA-CR-3116] N79-26021
A method of computing the pressure distribution on a single-bladed hovering helicopter rotor
N79-26044

PRESSURE EFFECTS
Wind excited motion of buildings
N79-26239
Pressurized water electrolysis test circuit: Initial operating results
[P/539/77/12] N79-26335
The prediction of geysering in fluid transfer lines by flooding theory
N79-26346

PRESSURE MEASUREMENTS
Fuselage surface pressure measurements of a helicopter wind-tunnel model with a 3.15-meter diameter single rotor
[NASA-TM-80051] N79-26015
Multichannel pressure sampling and storage system
[TDB-318] N79-26380
Airborne pressure and temperature measurements during the 1977 intertropical convergence zone experiment
N79-26727
Pressure and temperature measurements from the U-2 aircraft during the 1977 intertropical convergence experiment
N79-26728

PRESSURE REDUCTION
Experiments heat transfer and pressure drop for an array of colinear interrupted plates
N79-26358

PRESSURE SENSORS
Multichannel pressure sampling and storage system
[TDB-318] N79-26380

PRESSURE VESSELS
Critical experiments, measurements and analyses to establish a crack arrest methodology for nuclear pressure vessel steels
[PB-292777/0] N79-26198
Approximate method of elastic-plastic fracture analysis for nozzle corner cracks
[NUREG/CR-0472] N79-26433

PROBABILITY DENSITY FUNCTIONS
Coding for the control of intersymbol interference in baseband channels
N79-26248

PROBABILITY DISTRIBUTION FUNCTIONS
Probability of the mean sum of monthly precipitation in the Austrian Alps
N79-26691

PROBABILITY THEORY
The effect of ground relief upon the extreme values of intensity and duration of precipitation in Belgium. Methods and results
N79-26697

PROBLEM SOLVING
Concentrated force problems in transverse isotropy
N79-26420
A framework for problem-solving in a distributed processing environment
N79-26807
An iterative solver for a mixed variable variational formulation of the [first] biharmonic problem
[CTH-78.02-R] N79-26860

PROCEDURES
Description of main methodologies used for speaker recognition
[FUB-1-1978] N79-26274

PRODUCT DEVELOPMENT
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158736] N79-26488
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158740] N79-26490
Development of a process for a high capacity arc heater production of silicon for solar arrays
[NASA-CR-158745] N79-26499

PRODUCTION ENGINEERING
Process feasibility study in support of silicon material, task 1
[NASA-CR-158726] N79-26487
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-158723] N79-26497
Product differentiation in computer services
N79-26824

PRODUCTION MANAGEMENT
Manufacturing methods and technology measure for fabrication of silicon transcalent rectifier
[AD-A067880] N79-26328
A comparison of heuristic methods used in hierarchical production planning
[AD-A066932] N79-27004

PRODUCTIVITY
Large area silicon sheet by EFG — quality control and productivity of edge-defined film-fed growth of ribbons
[NASA-CR-158731] N79-26501

PROGRAMMING LANGUAGES
Direct execution language architecture for simulation
[AD-A067824] N79-26793
CONVERS: An interpretive compiler
[AD-A067746] N79-26794
Automatic data structure choice in SETL
N79-26802
An implementation of a system for the formal definition of programming languages
N79-26804
FQL a functional query language
[AD-A066992] N79-26812
The use of simulation languages for studying digital direct control systems
[FUB-5-1978] N79-26821
Q, a communications query language for SEED
[AD-A066994] N79-27011

PROJECT MANAGEMENT
A user's guide for TAC PERT
[AD-A068012] N79-27005

PROJECT PLANNING
Preliminary report on planning of the GARP mountain sub-program [ALPEX]
N79-26710

PRONY SERIES
Shipboard antenna pattern inversion using Prony's method
[AD-A068018] N79-26262

PROPANE
Radio frequency liquid level gauging in propane tank car safety tests: A feasibility study
[PB-292978/4] N79-26381

PROPELLERS
Comparative investigation of dynamic properties of some propeller vanes
[KNMI-WR-78-1] N79-26738

PROPORTIONAL COUNTERS
Proportional counter for X-ray analysis of lunar and planetary surfaces — a position sensitive scintillating imaging proportional counter
[NASA-CR-158754] N79-27051

PROPULSION SYSTEM CONFIGURATIONS
Thrust and mass flow characteristics of four 36 inch diameter tip turbine fan thrust vectoring systems in and out of ground effect
[NASA-CR-152239] N79-26056

PROPULSION SYSTEM PERFORMANCE
Performance of low thrust attitude control engines. Part 2: Hydrazine engines theoretical performance and transport properties of reaction products
[TUM-LRT-TB-77/6-PT-2] N79-26114
Performance of low thrust attitude control engines. Part 3: Power augmented hydrazine performance and thermodynamic properties of reaction products
[TUM-LRT-TB-77/7-PT-3] N79-26115
Performance of low thrust attitude control engines. Part 4: Correlation equation for experimental boundary layer losses
[TUM-LRT-TB-77/14-PT-4] N79-26116
Performance of low thrust attitude control engines. Part 5: Thrust loss determination by test-data-correlation
[TUM-LRT-TB-78/1-PT-5] N79-26117
Performance of low thrust attitude control engines. Part 6: Computation of boundary layer losses
[TUM-LRT-TB-78/2-PT-6] N79-26118

PROSTATE GLAND
Preparation of some prostaglandin E sub 1 omega-homo-prostaglandin E sub 1 esters and their inhibiting properties on rat blood platelet aggregation
N79-26765

PROSTHETIC DEVICES
Prosthesis coupling
[NASA-CASE-KSC-11069-1] N79-26772

PROTECTIVE CLOTHING
The optical properties of smoke-protective devices
[FAA-AM-78-41] N79-26784

PROTECTIVE COATINGS
Fire protection covering for small diameter missiles
[NASA-CASE-ARC-11104-1] N79-26100
Thermal fatigue of oxidation resistant overlay coatings for superalloys
N79-26156
Nickel plating, volume 2
[P/539/77/28] N79-26190
No more cadmium plating? Are there processes to replace it?
[DRIC-TRANS-5462] N79-26195
Solvent removable coatings for contaminant protection of microcircuits
[AD-A067745] N79-26212
Ultraviolet damage resistance of laser coatings
[LA-UR-78-2607] N79-26396

PROTEINS
Physiological effects of a high soybean protein diet in man
N79-26777

PROTON PRECIPITATION
Investigation of the phenomenology of the Arctic ionosphere and its relation to the phenomenology of Arctic particle precipitation, part 1
[AD-A067711] N79-26595

PROTON SCATTERING
Hadron production in high energy muon scattering
N79-26903

PROTOTYPES
Prototype development of an optimized, tapered-thickness, graphite/epoxy composite flywheel
[UCRL-52623] N79-26121

PROVING
SAMICS validation. SAMICS support study, phase 3
[NASA-CR-158746] N79-26491

PSYCHOPHYSIOLOGY
Structuring of data systems: Psychophysiological data from the dynamic flight simulator
[AD-A067175] N79-27014

PUBLIC LAW
National Weather Service Act of 1978
[GPO-31-606] N79-26730

PULSARS
A study of the pulsar in a binary system
N79-27039
The solution of two dimensional problems in astrophysics
N79-27047
Particle acceleration in pulsar magnetospheres
N79-27048

PULSE CODE MODULATION
The design of a high packing density PCM magnetic tape replay system
[RAE-TR-77140] N79-26378

PULSE GENERATORS
High voltage, low inductance hydrogen thyratron study program
[AD-A067178] N79-26319

PULSE RADAR
Echo tracker/range finder for radars and sonars
[NASA-CASE-NPO-14361-1] N79-26253

PULSE RATE
An iterative interpolation technique using finite impulse response digital filters
[AD-A067511] N79-26322

PULSED LASERS
Pulsed-laser-generated impulse on a surface in supersonic flow
[LOG-J-10741] N79-26012
Fluorescence measurements on a minidisc centrifugal analyzer with a pulsed nitrogen laser source
N79-26125

PULSES
Analysis of a model for the interpretation of chromatic delay in light emitting diodes
[FUB-31-1977] N79-26338

PYROGEN
Pyrogenic activity of carbon-filtered waters
[PB-293172/3] N79-27033

PYROLYSIS
Flame retardation of polymers
N79-26205
Laboratory study of pyrolysis of explosive contaminated waste
[AD-A066973] N79-26222

Q

QUADRANTS
Two concepts of positive dependence, with applications in multivariate analysis
[AD-A067545] N79-26848

QUADRATIC EQUATIONS
The prime discriminant factorization of discriminants of algebraic number fields
N79-26836
Linear state feedback, quadratic weights, and closed loop eigenstructures
[NASA-CR-158755] N79-26844
The stability of second order quadratic differential equations, part 2
[AD-A067813] N79-26851

QUALITY CONTROL
Large area silicon sheet by EFG --- quality control and productivity of edge-defined film-fed growth of ribbons
[NASA-CR-158731] N79-26501
QUANTITATIVE ANALYSIS
Quantitative comparison of electronic component-solder joint stress relief in encapsulated assemblies
[BDX-613-1868-REV] N79-26333
Quantitative analysis of defects in silicon. Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158738] N79-26492
Quantitative analysis of defects in silicon: Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158724] N79-26980
QUANTUM MECHANICS
Simultaneous quantum mechanical observations and nonlinear quantum stochastic filter
N79-26877
QUANTUM THEORY
Weak interactions at high energies --- broken gauge theory and elementary particle interactions
[SLAC-PUB-2177] N79-26914
Some non-perturbative results in relativistic field theory
N79-26995
QUATERNARY ALLOYS
Stress corrosion cracking of high strength Al-Zn-Mg-Cu alloys: Matrix precipitation
[RAE-TR-78110] N79-26174
The effect of grain structure on the stress corrosion resistance of Al-Zn-Mg-Cu alloys
[RAE-TR-78034] N79-26193
GaInAs and GaInAsP MBE crystal growth
[AD-A067164] N79-26985
QUEUEING THEORY
Markovian multiserver queueing systems with servers in series
N79-26826
Note on a time dependent queue M/D/1 with input equal to service rate
[RAE-TM-MATH-COMP-7807] N79-26832

R

RADAR BEACONS
Uplink ATCRBS environment measurements along the Boston-Washington corridor. Volume 2: Interrogator characteristics
[AD-A067944] N79-26041
RADAR DATA
Manually digitized radar data: Interpretation and application
[PB-293810/8] N79-26747
RADAR DETECTION
A Gaussian noise analysis of the pseudo-coherent discriminant
[AD-A067103] N79-26258
RADAR ECHOES
Gravity wave propagation in the presence of a current with an arbitrary vertical profile
[PB-293806/6] N79-26758
RADAR EQUIPMENT
Radar system analysis algorithms: Radar system analysis models of performance degradation by mutual interference
[AD-A068019] N79-26263
RADAR MEASUREMENT
Quantitative precipitation measurements by radar in the Ammer Mountains
N79-26624
RADAR SCATTERING
SNR for the EISCAT UHF system
[KWI-78-1] N79-26266
RADAR TRACKING
Echo tracker/range finder for radars and sonars
[NASA-CASE-NPO-14361-1] N79-26253
RADIATION CHEMISTRY
Laser studies of reactions
[AD-A067855] N79-26393
RADIATION DAMAGE
Ultrasonic studies of radiation damage in an aluminum-manganese alloy
N79-26965
Neutron damage correlation experiments in semiconductor devices
[AD-A066886] N79-26987
RADIATION DISTRIBUTION
Radiation balance at 2 high-altitude Alpine stations during the vegetation period
N79-26686
RADIATION DOSAGE
Radiation safety in the use of color television sets
[ISS-T-77/4] N79-26276
RADIATION EFFECTS
Evaluation of the effects of solar radiation on glass --- space environment simulation
[NASA-CR-161247] N79-26209
Information base for waste repository design. Volume 3: Waste/rock interactions
[PB-293403/2] N79-26924
Radiation effects on optical fibers
[FUB-16-1978] N79-26936
Studies of high-dose ion implantation in silicon --- differential resistivity, Hall effect, and spectroscopic analysis
N79-26975
RADIATION HARDENING
Radiation hardened CMOS/SOS code generator for space applications
[AD-A067980] N79-26327
RADIATION HAZARDS
Radiation safety in the use of color television sets
[ISS-T-77/4] N79-26276
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7651-PR] N79-26910
RADIATION MEASURING INSTRUMENTS
Activities of the Division of Quantum Metrology
[NPL-QU-AR-76] N79-26736
RADIATION SOURCES
Cosmic rays, volume 1. A bibliography with abstracts
[NTIS/PS-79/0386/7] N79-27059
RADIATION THERAPY
A preliminary study on the dosimetric properties of CaSO4: Dyribbon [TLD-900]
[ISS-P-78/14] N79-26902
RADIATIVE LIFETIME
Beam foil spectroscopy of heavy ions at energies from 20 to 238 MeV
[BNL-24909] N79-26916
RADIATIVE TRANSFER
Tropospheric radiative divergence during phase 3 of the GARP Atlantic Tropical Experiment [GATE]
[PB-292761/4] N79-26609
RADIO ALTIMETERS
High altitude altimeter flight test
[AD-A066904] N79-26054
RADIO ASTRONOMY
A study of the pulsar in a binary system
N79-27039
RADIO COMMUNICATION
Report on collaboration activity between the 'Istituto Superiore Poste e Telecomunicazioni' and the Ugo Bordoni Foundation in 1977
N79-26275
RADIO EMISSION
Collective radio-emission from plasmas
[AD-A066923] N79-26944
RADIO FREQUENCIES
Radio frequency liquid level gauging in propane tank car safety tests: A feasibility study
[PB-292978/4] N79-26381
Radiofrequency radiation levels and population exposure in urban areas of the eastern United States
[PB-292855/4] N79-26779
RADIO FREQUENCY INTERFERENCE
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 1: Non-military standards and national regulations. Survey of international and national standards and regulations on electrical interference and susceptibility
[ECR-79-PT-1] N79-26268
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 2: Military and special industrial standards, regulations, and reccomendations international and national standards, regulations, and recommendations on electrical interference and susceptibility
[ECR-80-PT-2] N79-26269
RADIO TELEMETRY
A long-range and long-life telemetry data-acquisition system for heart rate and multiple body temperatures from free-ranging animals
[NASA-TM-78590] N79-26762
RADIO WAVES
Rocket radio measurement of electron density in the nighttime ionosphere
[NASA-CR-157442] N79-26587
Gravitational time delay in orthogonally polarized radiation passing by the sun
[NASA-CR-158757] N79-27049
RADIOACTIVE MATERIALS
Dynamic analysis to establish normal shock and vibration of radioactive material shipping packages --- mechanical shock during rail transportation
[PB-293660/7] N79-26409
RADIOACTIVE WASTES
Information base for waste repository design. Volume 5: Decommissioning of underground facilities
[PB-293405/7] N79-26904
Risk methodology for geologic disposal of radioactive waste
[NUREG/CR-1458] N79-26906
Scoping study of salt domes, basalts and crystalline rock as related to long term risk modeling for deep geologic disposal of nuclear waste
[UCRL-13945] N79-26907
Alternative waste management options, Nuclear Fuel Services, Inc., high level waste --- converting to borosilicate glass
[ANL-K-78-4190-2] N79-26908
Seabed disposal program, volume 1
[SAND-78-1359] N79-26909
Storage and disposal of radioactive waste as glass in canisters
[PNL-2764] N79-26911
Analytical methodology and facility description spent fuel policy
[DOE/ET-0054] N79-26917
Geotechnical aspects of subsurface seabed disposal of high level radioactive wastes --- core sampling
[COO-4069-1] N79-26918
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919
Information base for waste repository design. Volume 1: Borehole and shaft sealing
[PB-293401/6] N79-26922
Information base for waste repository design. Volume 2: Equipment performance requirements
[PB-293402/4] N79-26923
Information base for waste repository design. Volume 3: Waste/rock interactions
[PB-293403/2] N79-26924
Information base for waste repository design. Volume 4: Mine structural features
[PB-293404/0] N79-26925
Information base for waste repository design. Volume 6: Excavation technology
[PB-293406/5] N79-26926
Information base for waste repository design. Volume 7: Executive summary
[PB-293407/3] N79-26927
RADIOMETERS
Preliminary results from the University of Denver infrared spectrometer - 1977 intertropical convergence zone experiment
N79-26724
U-2 water vapor burden observations through the tropopause
N79-26726
RADIOSONDES
Remote measurement of the atmospheric parameters, using a radioacoustic sounder
N79-26625
RAIL TRANSPORTATION
Dynamic analysis to establish normal shock and vibration of radioactive material shipping packages --- mechanical shock during rail transportation
[PB-293660/7] N79-26409
RAIN
Processing methodology for daily pluviometric data
[MN-MONO-102] N79-26619
Spatial and temporal fluctuations of precipitations within an intra-Alpine area as function of general atmospheric circulation [examples taken in Savoy]
N79-26692
Relationship between raingauge tipping volume and rain rate distributions
[FUB-32-1977] N79-26739
The IMI network in Sweden: Present equipment, methods, and plans for improvement
[AC-40] N79-26740
RAIN GAGES
Relationship between raingauge tipping volume and rain rate distributions
[FUB-32-1977] N79-26739
RAINDROPS
Chaff seeding in a dynamical-electrical cloud model
N79-26617
RAMAN SPECTROSCOPY
Raman studies of the orientational motions of small diatomics dissolved in argon, 1; and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite, 2
N79-26122
Experimental studies of coherent anti-Stokes Raman spectroscopy in liquids
N79-26123
RANDOM ERRORS
Adaptive delta modulation: Digital filtering and the effects of random channel errors
N79-26310
RANDOM NOISE
A Gaussian noise analysis of the pseudo-coherent discriminant
[AD-A067103] N79-26258
Estimator performance for a class of nonlinear estimation problems
[AD-A067661] N79-26870
RANDOM PROCESSES
Quantization for statistical classification
N79-26250
RANDOM VIBRATION
Random vibration introduction: Environments, damaging effects, tests, test specifications and test economy
[ECR-84] N79-26435
RANDOM WALK
Improvement of the steady floating random walk Monte Carlo method near straight line and circular boundaries with application to groundwater flow
[PB-292560/0] N79-26453

RANGE ERRORS
Accurate determination of ionospheric effects on satellite based positioning systems using a versatile three-dimensional ray tracing program
[UIO-SR-78-04] N79-26267

RANGE FINDERS
Echo tracker/range finder for radars and sonars
[NASA-CASE-NPO-14361-1] N79-26253

RANKINE CYCLE
Rankine-cycle component characteristics N79-26478
Candidate power-conversion system cycles, appendix A N79-26484

RARE EARTH COMPOUNDS
Electronically induced phase transformations --- in rare earth superdonducting compounds
[AD-A067066] N79-26983

RARE EARTH ELEMENTS
Catalytic properties of natural and rare-earth-promoted manganese nodules
[PB-293267/1] N79-26200
A preliminary study on the dosimetric properties of CaSO4: Dyribbon [TLD-900]
[ISS-P-78/14] N79-26902

RARE GASES
Inert gas thrusters
[NASA-CR-159527] N79-26110

RAREFIED GASES
Raman studies of the orientational motions of small diatomics dissolved in argon, 1; and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite, 2 N79-26122

RATES [PER TIME]
Note on a time dependent queue M/D/1 with input equal to service rate
[RAE-TM-MATH-COMP-7807] N79-26832

RATS
Preparation of some prostaglandin E sub 1 omega-homo-prostaglandin E sub 1 esters and their inhibiting properties on rat blood platelet aggregation N79-26765
Influences of dietary fats on coronary flow rate and left ventricular work of the isolated rat heart N79-26766
Effects of dietary fats on the coronary flow rate and the left ventricular function of the isolated rat heart N79-26767

RAY TRACING
Accurate determination of ionospheric effects on satellite based positioning systems using a versatile three-dimensional ray tracing program
[UIO-SR-78-04] N79-26267
Use of a single function subroutine for multi-region ionospheric profiles with a versatile three-dimensional ray tracing program
[UIO-SR-78-03] N79-26599

RAYLEIGH EQUATIONS
Gravity wave propagation in the presence of a current with an arbitrary vertical profile
[PB-293806/6] N79-26758

RC CIRCUITS
Simultaneous realization of input and transfer impedances in RC ladder networks N79-26308

REACTION KINETICS
Effect of vibrational excitation in reactions of OH with H2
[AD-A058571] N79-26134
ARIS manual
[AD-A067830] N79-26139
The kinetics of the oxidation of graphite by an impinging jet of gas
[NRC/CNR-TT-1938] N79-26172
The characterization of a slurry explosive: Teledet
[AD-A066942] N79-26223
Computational study of chemical reaction dynamics at the gas-solid interface
[AD-A067854] N79-26392
Laser studies of reactions
[AD-A067855] N79-26393
AE reaction rate data
[AD-A067941] N79-26593
Computer-aided investigation of reaction path synthesis N79-26891
Crossed molecular beam study of the reactions of oxygen and fluorine atoms
[AD-A067848] N79-26894
Low energy ion-molecule reaction dynamics and chemiionization kinetics
[COO-4694-1] N79-26897

REACTOR DESIGN
Doublet demonstration fusion power reactor study
[GA-A-14742] N79-26946

REACTOR MATERIALS
Effect of fission product interactions on the corrosion and mechanical properties of HTGR alloys
[BNL-NUREG-25325] N79-26180
Critical experiments, measurements and analyses to establish a crack arrest methodology for nuclear pressure vessel steels
[PB-292777/0] N79-26198
Materials problems with inertial confinement fusion targets --- gold and tungsten coatings
[LA-UR-79-76] N79-26945
Fusion power program
[ANL/FPP-78-2] N79-26953
High temperature properties of nuclear reactor coolants and thermodynamic power cycle working Fluids --- in liquid metal fast breeder reactors
[COO-3027-37] N79-27001

REACTOR SAFETY
Flaw evaluation procedures --- inspecting nuclear power plant components
[EPRI-NP-719-SR] N79-26415
A summary of the regional tectonics and seismicity of eastern Kansas; summary of project activities and results to the end of the second year, or September 10, 1979
[PB-293661/5] N79-26610

REACTOR TECHNOLOGY
Proposal to the United States Energy Research and Development Administration for continuation of fusion reactor technology studies
[COO-4636-1] N79-26511

REAL TIME OPERATION
Real-time onboard geometric image correction N79-26084
CAT information display system users manual
[NASA-CR-161243] N79-26711

RECEIVERS
Central receiver thermal power system
[AED-CONF-78-212-008] N79-26513

RECOMBINATION COEFFICIENT
Atomic reaction rates in H[-] and D[-] plasmas
[UCID-18031] N79-26948

REDUCTION [CHEMISTRY]
Reduction of silica supported nickel catalysts N79-26194
A chemical theory for the thermodynamics of highly solvated liquid metal mixtures N79-26996

REDUNDANCY
Redundancy analysis and associated asymptotic distribution theory N79-26865

REFLECTORS
Ultraviolet damage resistance of laser coatings
[LA-UR-78-2607] N79-26396

REGENERATION [ENGINEERING]
Evaluation of available MHD seed-regeneration processes on the basis of energy considerations
[ANL/MHD-78-4] N79-26519

REGIONAL PLANNING
Lands in transition: Lake Champlain shoreland changes, 1960 - 1990
[PB-293431/3] N79-26461
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
Draft SCAG-78 growth forecast policy
[PB-293245/7] N79-27032

REGRESSION ANALYSIS
An approach to biased estimation in regression analysis N79-26839
A study of the effects of error of measurement on multiple regression analysis and a comparison of possible correction techniques N79-26840
Approximate tests of hypotheses in regression models with grouped data
[AD-A066926] N79-26845
Spline regression algorithms and local dependence
[AD-A067248] N79-26846
The least-squares estimation of latent trait variables by a Hilbert space approach
[AD-A067279] N79-26847
Least squares prediction for mixed autoregressive moving average time series
[AD-A067768] N79-26850

REGULATIONS
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 1: Non-military standards and national regulations. Survey of international and national standards and regulations on electrical interference and susceptibility
[ECR-79-PT-1] N79-26268
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 2: Military and special industrial standards, regulations, and reccomendations international and national standards, regulations, and recommendations on electrical interference and susceptibility
[ECR-80-PT-2] N79-26269

RELATIVISTIC THEORY
Relativistic information of the GPS-NAVSTAR position determination algorithm N79-26095
Free electron lasers and stimulated scattering from relativistic electron beams
[AD-A066177] N79-26387
Theory of solid state cyclotron maser
[AD-A066174] N79-26389
Some non-perturbative results in relativistic field theory N79-26995

RELIABILITY ANALYSIS
Low cost components: Selection and acquisition of microelectronic devices
[AD-A067667] N79-26321
Trends in reliability modeling technology for fault tolerant systems
[NASA-TM-80089] N79-26810

REMOTE CONTROL
Study of modeling and evaluation of remote manipulation tasks with force feedback
[NASA-CR-158721] N79-26785

REMOTE SENSORS
Regional geologic analysis of the Black Hills of South Dakota and Wyoming from remote sensing data N79-26437
Earth information from space by remote sensing
[PB-292736/6] N79-26454
AID's remote sensing grant program
[PB-292872/9] N79-26456
CCRS airborne program assessment. Volume 1: Analysis
[PB-293161/6] N79-26469
CCRS airborne program assessment. Volume 2: User reports
[PB-293162/4] N79-26470
Measurement of NO and O3 from aircraft: 1977 tropical convergence zone experiment N79-26720

RENDEZVOUS TRAJECTORIES
Rendezvous missions to comets with electrically spacecraft
[TUM-LRT-TB-78/6-1] N79-26081
An encounter with Halley's comet at 24 km per second
[TUM-LRT-TB-78/5] N79-27052

REPEATERS
Comments on repeater distance dimensioning in coaxial cable digital data transmission
[FUB-26-1977] N79-26337

REPUBLIC OF SOUTH AFRICA
CSIR annual report, 1978 --- research and development activities in the Republic of South Africa
[AR-34] N79-27061

RESEARCH
High pressure science and technology in Japan --- biochemical and geophysical reactions, superhard materials, and other research
[ONRT-M1] N79-26361
Laser studies of reactions
[AD-A067855] N79-26393
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
International science indicators: Development of indicators of international scientific activity using the science citation index
[PB-293033/7] N79-27020

RESEARCH AND DEVELOPMENT
Vertical axis wind turbine status
[SAND-78-0397C] N79-26512
Metal hydride research and development program at Brookhaven National Laboratory
[BNL-25215] N79-26516
Annual report to the Congress for 1978 --- technology assessment
[PB-293088/1] N79-27027
CSIR annual report, 1978 --- research and development activities in the Republic of South Africa
[AR-34] N79-27061

RESEARCH FACILITIES
Proceedings of workshops to define engineering requirements for a space vacuum research facility
[NASA-CP-2091] N79-26076
Proceedings of workshops to define engineering requirements for a space vacuum research Facility: Summary N79-26077
NASA workshop on outgassing N79-26078
Activities of the Technical Research Center of Finland N79-27062

RESEARCH MANAGEMENT
Preliminary thoughts on proxy PNA
[CONF-781150-5] N79-26148
Proposal to the United States Energy Research and Development Administration for continuation of fusion reactor technology studies
[COO-4636-1] N79-26511
Research summary--oil spills
[PB-293597/1] N79-26558
Operational activities N79-26717
Management of federal R and D for commercialization: Executive summary
[PB-292851/3] N79-27036
Management of federal R and D for commercialization
[PB-292852/1] N79-27037
Management of federal R and D for commercialization: Appendices: Supporting documentation
[PB-292853/9] N79-27038
Activities of the Technical Research Center of Finland N79-27062

RESEARCH PROJECTS
Research programme on turbulent shear layers
[IC-AERO-78-105] N79-26032
CCRS airborne program assessment. Volume 1: Analysis
[PB-293161/6] N79-26469
CCRS airborne program assessment. Volume 2: User reports
[PB-293162/4] N79-26470
A Kentucky energy resource utilization program
[PB-292949/5] N79-26538
RESERVOIRS
Interactive multiple objective optimization
[PB-293211/9] N79-26468
RESIDENTIAL AREAS
Survey of disruption and consumer costs resulting from a major residential power outage
[ANL/EES-TM-29] N79-26520
RESILIENCE
Summary of past experience in natural laminar flow and experimental program for resilient leading edge
[NASA-CR-152276] N79-26024
RESISTOJET ENGINES
Construction of a high performance resistojet for satellite propulsion
[PERME-TR-99] N79-26112
RESOLUTION
The effect of vertical resolution in a limited area atmospheric model
N79-26665
RESONANCE CHARGE EXCHANGE
Analytic models for the treatment of alternant linear heteropolymers
N79-26203
Research on resonant charge-exchange X-ray and ultraviolet lasers
[AD-A067227] N79-26391
RESONATORS
Optical quality of tilted spherical mirror unstable resonators
[AD-A068015] N79-26394
RESOURCES MANAGEMENT
Land and natural resources management: An analysis of selected Federal policies programs, and planning mechanisms. Report to the President's Interagency Task Force on Environmental Data and Monitoring Programs
[PB-292500/6] N79-26449
CSIR annual report, 1978 --- research and development activities in the Republic of South Africa
[AR-34] N79-27061
RESPIRATORY SYSTEM
Techniques of cumulative quantitative characterization of the thorax using audiosonic methods
N79-26769
RESPONSE BIAS
Improved camera-tube performance with pulsed operation
[AD-A067336] N79-26317
RHENIUM ALLOYS
Construction of a high performance resistojet for satellite propulsion
[PERME-TR-99] N79-26112
RHODIUM ALLOYS
Morphology and sintering of platinum, palladium, rhodium and platinum-alloys on SiO2 and graphite
N79-26168
RIBBONS
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158735] N79-26495
Large area silicon sheet by EFG --- quality control and productivity of edge-defined film-fed growth of ribbons
[NASA-CR-158731] N79-26501
Quantitative analysis of defects in silicon: Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158724] N79-26980
RISK
Risk methodology for geologic disposal of radioactive waste
[NUREG/CR-1458] N79-26906
Scoping study of salt domes, basalts and crystalline rock as related to long term risk modeling for deep geologic disposal of nuclear waste
[UCRL-13945] N79-26907
RIVER BASINS
Present and potential sediment yields in the Yampa River Basin, Colorado and Wyoming
[PB-292677/2] N79-26455
RIVERS
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578
ROCKET ENGINES
General purpose rocket furnace
[NASA-CASE-MFS-23460-1] N79-26075
A review of the UK T5 electron-bombardment mercury ion thruster
[RAE-TR-77191] N79-26109
ROCKET EXHAUST
Feasibility of non-catapult ejection and hazard of an ejection seat rocket plume
[AD-A067080] N79-26036
ROCKET SOUNDING
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment
N79-26719
ROCKY MOUNTAINS [NORTH AMERICA]
Mountain winds in the plains
N79-26645
ROLL FORMING
Computer-aided analysis and design of the shape rolling process for producing turbine engine airfoils
[NASA-CR-135367] N79-26175
ROTARY WINGS
System design requirements for advanced rotary-wing agricultural aircraft
[NASA-CR-158938] N79-26046
Helicopter Icing Symposium
[AD-A067981] N79-26048
Icing tests of a UH-1H helicopter with an electrothermal ice protection system under simulated and natural icing conditions
[AD-A067737] N79-26050
ROTATING FLUIDS
Inertial perturbations to inertialess magnetohydrodynamic and rotating flows
N79-26342
ROTATING SHAFTS
Commercial synchronous alternating-current generators
N79-26482
ROTOR BLADES
A method of computing the pressure distribution on a single-bladed hovering helicopter rotor
N79-26044
Icing tests of a UH-1H helicopter with an electrothermal ice protection system under simulated and natural icing conditions
[AD-A067737] N79-26050
ROTOR BLADES [TURBOMACHINERY]
An evaluation of linear acoustic theory for a hovering rotor
[NASA-TM-80059] N79-26881
RUBBER COATINGS
The tearing of weathered rubber-coated fabrics
[RAE-TR-78005] N79-26218
RUMANIA
The analysis of the influence of the Romanian Carpathians upon wind forecasting in Romania
N79-26673
Ice depositions in Rumanian mountainous regions
N79-26704
An objective analysis of the climatological parameters of thunderstorm activity over the Rumanian Carpathians
N79-26705
RUNWAY CONDITIONS
An operational research investigation of the ice-detection capability and utility of the surface condition analyzer [SCAN] system and its applicability to Navy-wide use
[AD-A067174] N79-26037

S

S WAVES
The propagation of surface shear waves. Volume 1: Theory
N79-26277
The propagation of surface shear waves. Volume 2: Experiments
N79-26278
SAFETY
Highway capacity, measures of effectiveness, and flow theory
[PB-292763/0] N79-27029
SAFETY MANAGEMENT
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7651-PR] N79-26910
SAHARA DESERT [AFRICA]
Transport and deposition of Saharan dust over Alps
N79-26670
SALINITY
CTD observations off the coast of Peru, R/V Melville, 4 March - 22 May 1977, and R/V Columbus Iselin, 5 April - 19 May 1977
[PB-293377/8] N79-26761
SAMPLERS
Intertropical convergence zone ozone profiles from the Learjet ozone analyzer
N79-26723
SAMPLING
Regulatory water quality monitoring. A systems perspective
[PB-292756/4] N79-26552
SANDS
The role of mold atmospheres in the penetration of molten steel into sand molds
N79-26163
SATELLITE ATTITUDE CONTROL
Navigation and attitude reference for autonomous satellite launch and orbital operations
N79-26089
SATELLITE NAVIGATION SYSTEMS
A comparison of filtering algorithms for GPS satellite navigation application
N79-26094
SATELLITE ORBITS
Flight Mechanics/Estimation Theory Symposium --- with application to autonomous navigation and attitude/orbit determination
[NASA-CP-2082] N79-26082
Navigation and attitude reference for autonomous satellite launch and orbital operations
N79-26089
SATELLITE ORIENTATION
Orbit/attitude estimation with LANDSAT Landmark data
N79-26086
Multiple scene attitude estimator performance for LANDSAT-1
N79-26087
Autonomous attitude estimation via star sensing and pattern recognition
N79-26088
SATELLITE ROTATION
Spin axis tilt of satellite induced by the internal fluid migration
[NASDA-TR-8] N79-26103
SATELLITES
Low noise devices for satellite communication systems
[RAE-TR-78076] N79-26279
SAWS
Slicing of silicon into sheet material. Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158743] N79-26978
SCANNING
Scanner development
[AD-A066902] N79-26390
SCENE ANALYSIS
Multiple scene attitude estimator performance for LANDSAT-1
N79-26087
SCHLIEREN PHOTOGRAPHY
A simple method of adapting a wind tunnel Schlieren system for interferometry
[AD-A067233] N79-26073
SCHMIDT TELESCOPES
The UK 1.2m Schmidt telescope and the southern sky survey. Part 2: Photographic techniques
[ROE-OR-4-PT-2] N79-27046
SCHOTTKY DIODES
Preparation and properties of Au-[-n] A sub X Ga sub 1 minus X aS-[n]GaAs Schottky-Barrier solar cells
N79-26473
SCHROEDINGER EQUATION
Relationship between Dirac and matrix Schroedinger inverse scattering transforms
[PM/78/6] N79-26854
SCIENTIFIC SATELLITES
AE reaction rate data
[AD-A067941] N79-26593
SCINTILLATION
Proportional counter for X-ray analysis of lunar and planetary surfaces --- a position sensitive scintillating imaging proportional counter
[NASA-CR-158754] N79-27051
SCRUBBERS
Disposal of by-products from nonregenerable flue gas desulfurization systems
[PB-293163/2] N79-26575
SEAPLANES
The characteristics of the spray generated by the efflux of various aircraft propulsors impinging normally on water
[AD-A067742] N79-26049
SEARCHING
The multiple path problem in data base schemata
[AD-A067147] N79-27015
SEASAT SATELLITES
Satellite oceanography of eastern boundary currents and its implications to ASW
[AD-A067259] N79-26754
SEASONS
A comparison between the Bernese Jura and Bernese Alps, based on the spring and autumn phenologic phases
N79-26654
SEDIMENT TRANSPORT
Present and potential sediment yields in the Yampa River Basin, Colorado and Wyoming
[PB-292677/2] N79-26455
Proceedings of a Workshop on Coastal Sediment Transport Study
[PB-293632/6] N79-26757
SEDIMENTS
Study of a density cell to measure suspended load
[PB-292934/5] N79-26452

Erosion and sedimentation nonpoint pollution sources and controls, LaPlatte River watershed
[PB-293436/2] N79-26576
Geotechnical aspects of subsurface seabed disposal of high level radioactive wastes --- core sampling
[COO-4069-1] N79-26918

SEISMIC ENERGY
Determination of the seismic design parameters: A stochastic approach
N79-26585

SEISMIC WAVES
On the development of strong-motion instrument networks in the United States
[PB-293579/9] N79-26612

SEISMOGRAPHS
On the development of strong-motion instrument networks in the United States
[PB-293579/9] N79-26612

SEISMOLOGY
Acoustic-to-seismic coupling properties and applications to seismic sensors
[AD-A067348] N79-26591
A summary of the regional tectonics and seismicity of eastern Kansas; summary of project activities and results to the end of the second year, or September 10, 1979
[PB-293661/5] N79-26610

SELENIUM ALLOYS
Optical transmission characterization of flash evaporated amorphous Se-Ge films
N79-26929

SELF ADAPTIVE CONTROL SYSTEMS
On the stability and convergence of self-tuning algorithms
[OUEL-1259/78] N79-26833

SEMANTICS
An implementation of a system for the formal definition of programming languages
N79-26804
Algorithms needed in a natural language understanding system
[PB-293232/5] N79-26823

SEMICONDUCTING FILMS
Specific heat of superconducting films of indium and of indium alloyed with magnetic impurities
N79-26968
GaInAs and GaInAsP MBE crystal growth
[AD-A067164] N79-26985

SEMICONDUCTOR DEVICES
A dynamic crossed-field photomultiplier with an electron bombarded semiconductor collector
N79-26307
Manufacturing methods and technology measure for fabrication of silicon transcalent rectifier
[AD-A067880] N79-26328
Interband transitions of semiconducting oxides determined from photoelectrolysis spectra
[AD-A066188] N79-26982
GaInAs and GaInAsP MBE crystal growth
[AD-A067164] N79-26985
Neutron damage correlation experiments in semiconductor devices
[AD-A066886] N79-26987
Laser assisted semiconductor device processing --- energy transfer, thermal properties, and photon absorption
[AD-A067183] N79-26988

SEMICONDUCTORS [MATERIALS]
The NRL program on electroactive polymers
[AD-A067736] N79-26213
Gallium arsenide metal semiconductor field effect transistor fabrication based upon the processing of an individual die
N79-26298
Atomic and electrical profile studies of ion-implanted semiconductors
N79-26303
Techniques for the preparation and analysis of standard silicon semiconductor specimens for the ion microprobe mass analyzer
[PB-292806/7] N79-26341
Process feasibility study in support of silicon material, task 1
[NASA-CR-158726] N79-26487
Study of electronic transport and breakdown in thin insulating films
[AD-A066918] N79-26984
Semiconductor measurement technology: DISTRIB 1, an impurity redistribution computer program
[PB-293293/7] N79-26994

SEPARATED FLOW
Control of forebody three-dimensional flow separations
[NASA-TM-78593] N79-26014

SEPARATION
Light scattering from phase separated glass
N79-26207

SEPARATORS
Electrical characterization of standard and radiation-hardened RCA CDP1856D 4-BIT, CMOS, bus buffer/separator
[NASA-CR-158725] N79-26314

SEQUENCING
A microprocessor sequencer for the UK T5 ion thruster and power conditioner unit
[RAE-TR-78057] N79-26797

SERVICE LIFE
Measurement techniques and instruments suitable for life-prediction testing of photovoltaic arrays
[NASA-CR-158733] N79-26486

SET THEORY
Minimax subset selection for the multinomial and Poisson distributions
[AD-A067187] N79-26868
Contribution to the theory of [N,M]-compact, paracompact and normal spaces
N79-26878

SEWAGE TREATMENT
National Conference on Less Costly Wastewater Treatment Systems for Small Communities
[PB-293254/9] N79-27031

SHAFTS [MACHINE ELEMENTS]
Design charts for torsional properties of non-circular shafts --- stress analysis
[AD-A064109] N79-26401

SHALE OIL
Compendium reports on oil shale technology
[PB-293279/6] N79-26237

SHEAR LAYERS
Research programme on turbulent shear layers
[IC-AERO-78-105] N79-26032

SHIPS
Multiple object tracking with non-unique data-to-object association via generalized hypothesis testing --- tracking several aircraft near each other or ships at sea
N79-26090
Shipboard antenna pattern inversion using Prony's method
[AD-A068018] N79-26262

SHOCK WAVES
The dc magnetic field observations at the earth's bow shock
[LPS-78-5] N79-27050

SHORELINES
Lands in transition: Lake Champlain shoreland changes, 1960 - 1990
[PB-293431/3] N79-26461
Proceedings of a Workshop on Coastal Sediment Transport Study
[PB-293632/6] N79-26757

SHORT TAKEOFF AIRCRAFT
Quiet propulsive lift for commuter airlines
[NASA-TM-78596] N79-26035

SHORT WAVE RADIATION
Quantitative evaluation of the short-wave radiation balance of a glacier
N79-26689

SIGNAL ANALYSIS
Evaluation of the two-dimensional Fourier transform applied to acoustic image pattern measurements
[AD-A068017] N79-26888

SIGNAL PROCESSING
A longitudinal coupling mechanism in multi-pair cable crosstalk
N79-26249
Quantization for statistical classification
N79-26250
A scannable beam-forming interferometer antenna array system
[NASA-CASE-GSC-12365-1] N79-26252
A method for the formal description of signaling systems
[FUB-4-1978] N79-26282
A determination of the first two moments of the ale output detector
[AD-A067213] N79-26320
An iterative interpolation technique using finite impulse response digital filters
[AD-A067511] N79-26322
The direct phase cepstrum and its applications to ultrasonic testing
N79-26414
Automatically decomposing signal processing applications on multiprocessors
N79-26806
Frequency-variant optical signal processing
N79-26928

SIGNAL TO NOISE RATIOS
SNR for the EISCAT UHF system
[KWI-78-1] N79-26266
Low noise devices for satellite communication systems
[RAE-TR-78076] N79-26279
Averaging filter for analog processing of gravitational signals
[LPS-78-10] N79-26280

SIGNIFICANCE
Subjective speaker recognition: Statistical consideration on attainable results significance
[FUB-17-1978] N79-26287

SILICON
Design and analysis of integrated electrothermal filters
N79-26295
Techniques for the preparation and analysis of standard silicon semiconductor specimens for the ion microprobe mass analyzer
[PB-292806/7] N79-26341
Process feasibility study in support of silicon material, task 1
[NASA-CR-158726] N79-26487
Array automated assembly task for the low cost solar array project, phase 2
[NASA-CR-158727] N79-26489
Quantitative analysis of defects in silicon. Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158738] N79-26492
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158735] N79-26495
Continuous Czochralski growth. Silicon sheet growth development of the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158730] N79-26496
Development of a process for a high capacity arc heater production of silicon for solar arrays
[NASA-CR-158745] N79-26499
Low cost solar array project: Composition measurements by analytical photon catalysis
[NASA-CR-158737] N79-26500
Large area silicon sheet by EFG --- quality control and productivity of edge-defined film-fed growth of ribbons
[NASA-CR-158731] N79-26501
Studies of high-dose ion implantation in silicon --- differential resistivity, Hall effect, and spectroscopic analysis
N79-26975
Doping process in silicon epitaxy: Transfer function and physicochemical model
N79-26976
Evaluation of selected chemical processes for production of low-cost silicon, phase 3
[NASA-CR-158739] N79-26977
Slicing of silicon into sheet material. Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158743] N79-26978
Slicing of silicon into sheet material: Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158732] N79-26979
Quantitative analysis of defects in silicon: Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158724] N79-26980
Silicon ingot casting, heat exchanger method multi-wire slicing, fixed abrasive slicing technique. Phase 3: Silicon sheet growth development for the large area sheet task of the low-cost solar array project
[NASA-CR-158734] N79-26981
Semiconductor measurement technology: DISTRIB 1, an impurity redistribution computer program
[PB-293293/7] N79-26994

SILICON ALLOYS
Properties of superconducting Nb3Si
[BNL-24949] N79-26330
Lattice parameters of iron-aluminum silicon alloys with the DO3 structure
[IS-T-831] N79-26992

SILICON COMPOUNDS
Synthesis of silicon-nitrogen-phosphorus compounds including a new synthesis of phosphazenes
[AD-A067274] N79-26137

SILICON CONTROLLED RECTIFIERS
Manufacturing methods and technology measure for fabrication of silicon transcalent rectifier
[AD-A067880] N79-26328

SILICON DIOXIDE
Reduction of silica supported nickel catalysts
N79-26194
Fabrication and testing of a sensitive ultraviolet-visible silicon photodiode device
N79-26370

SILICON FILMS
Growth and structure of ion beam sputtered thin films of gold and cadmium sulfide on silicon substrate
N79-26131

SILICON OXIDES
Silicon oxide studies: Physical modeling and device applications of thermal oxidation of heavily doped silicon
N79-26300

SIMULATION
A simulation study of Large Area Crop Inventory Experiment [LACIE] technology
[E79-10216] N79-26443
Fault simulation, analysis and diagnosis of a microprocessor
N79-26790

SIMULATORS
Sandia laboratory combustion simulation facility --- for analyzing the flow of high temperature combustion products
[SAND-78-2240] N79-26146

SINGLE SIDEBAND TRANSMISSION
AN/UYA-7 interface for USAF HF aeronautical stations
[AD-A067148] N79-26259

SINGLE-PHASE FLOW
Pulsed neutron measurement of single and two-phase liquid flow
[CONF-781113-31] N79-26896

SINGULARITY [MATHEMATICS]
Concentrated force problems in transverse isotropy
N79-26420

SINTERING
Morphology and sintering of platinum, palladium, rhodium and platinum-alloys on SiO2 and graphite
N79-26168
Thermodynamics and mechanisms of sintering
[LBL-8419] N79-26998
SIRIO SATELLITE
SIRIO: One year of station keeping
N79-26098
SITES
LLL wind energy studies [OAHU]
[UCRL-82171] N79-26514
SKYLAB PROGRAM
Catalog of far-ultraviolet objective-prism spectrophotometry: Skylab experiment S-019, ultraviolet stellar astronomy
[NASA-RP-1031] N79-27057
SLEEVES
Prosthesis coupling
[NASA-CASE-KSC-11069-1] N79-26772
SLENDER BODIES
Hypersonic flow past a slender elliptic cone
[AD-A068002] N79-26028
SLICING
Analysis and evaluation of processes and equipment in tasks 2 and 4 of the low-cost solar array project
[NASA-CR-158744] N79-26485
Slicing of silicon into sheet material. Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158743] N79-26978
Slicing of silicon into sheet material: Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158732] N79-26979
SLOTS
Slotting by electrochemical grinding
[BDX-613-1908-REV] N79-26405
SLURRIES
The characterization of a slurry explosive: Teledet
[AD-A066942] N79-26223
SMOKE
A study of smoke movement in an aircraft fuselage
[RAE-TM-EP-613] N79-26040
The optical properties of smoke-protective devices
[FAA-AM-78-41] N79-26784
SNOW
Preliminary wind tunnel simulation study of snow collection gauges
[UTIAS-TN-219] N79-26373
Remote sensing program
[E79-10211] N79-26440
Digital simulation of snowmelt runoff
[PB-293252/3] N79-26457
Effect of water content on the compressibility of snow-water mixtures
[AD-A066936] N79-26589
Study of water drainage from columns of snow
[AD-A066935] N79-26590
Snow on the Po watershed of the Northern Apennines
N79-26702
Record winter storms in Illinois, 1977 - 1978
[PB-293181/4] N79-26752
SNOW COVER
The ratio of the number of days with snow cover to that with snowfall in the Serbian Mountains of Yugoslavia
N79-26700
SNOWSTORMS
Probability and productivity of important snowfalls in the mountains, particularly in the region of Davos
N79-26699
The ratio of the number of days with snow cover to that with snowfall in the Serbian Mountains of Yugoslavia
N79-26700
Situations causing late snowfall over the French Alps
N79-26703
SODIUM CHLORIDES
Thin-source concentration dependent diffusion --- using isotopic labeling for measuring the diffusion of calcium cations in sodium chloride
N79-26966
SOIL EROSION
Erosion and sedimentation nonpoint pollution sources and controls, LaPlatte River watershed
[PB-293436/2] N79-26576
SOIL MOISTURE
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978 --- Colby, Kansas and Yuma, Colorado
[E79-10215] N79-26442
SOILS
The relationship of the thermal regime of the soil to the extrinsic environment, with special reference to the north central United States
N79-26582
SOLAR ACTIVITY
Solar-geophysical data number 414 [supplement], February 1979. Part 1: Prompt Reports. Data for December 1978 - January 1979
[PB-294770/3] N79-27054
Solar-geophysical data number 414 [supplement], February 1979. Part 2: Comprehensive reports. Data for August - July 1978 and miscellanea
[PB-294771/1] N79-27055
Solar-geophysical data number 414 [supplement], February 1979: Explanation of data reports
[PB-294772/9] N79-27056
SOLAR ARRAYS
Method of construction of a multi-cell solar array
[NASA-CASE-MFS-23540-1] N79-26475
Analysis and evaluation of processes and equipment in tasks 2 and 4 of the low-cost solar array project
[NASA-CR-158744] N79-26485
Measurement techniques and instruments suitable for life-prediction testing of photovoltaic arrays
[NASA-CR-158733] N79-26486
Array automated assembly task for the low cost solar array project, phase 2
[NASA-CR-158727] N79-26489
SAMICS validation. SAMICS support study, phase 3
[NASA-CR-158746] N79-26491
Solar cell modules with parallel oriented interconnections
[NASA-CR-158742] N79-26493
Continuous Czochralski growth. Silicon sheet growth development of the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158730] N79-26496
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-158723] N79-26497
Array automated assembly, phase 2
[NASA-CR-158728] N79-26498
Development of a process for a high capacity arc heater production of silicon for solar arrays
[NASA-CR-158745] N79-26499
Low cost solar array project: Composition measurements by analytical photon catalysis
[NASA-CR-158737] N79-26500
Large area silicon sheet by EFG --- quality control and productivity of edge-defined film-fed growth of ribbons
[NASA-CR-158731] N79-26501
A method for correlating performance data of a terrestrial solar cell array
[NASA-TM-79163] N79-26503
Slicing of silicon into sheet material. Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158743] N79-26978
Slicing of silicon into sheet material: Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158732] N79-26979
Silicon ingot casting, heat exchanger method multi-wire slicing, fixed abrasive slicing technique. Phase 3: Silicon sheet growth development for the large area sheet task of the low-cost solar array project
[NASA-CR-158734] N79-26981
SOLAR CELLS
Preparation and properties of Au-[-n] A sub X Ga sub 1 minus X aS-[n]GaAs Schottky-Barrier solar cells
N79-26473
Analysis and evaluation of processes and equipment in tasks 2 and 4 of the low-cost solar array project
[NASA-CR-158744] N79-26485
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158736] N79-26488
Array automated assembly task for the low cost solar array project, phase 2
[NASA-CR-158727] N79-26489
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158740] N79-26490
Solar cell modules with parallel oriented interconnections
[NASA-CR-158742] N79-26493
Investigation of test methods, material properties, and processes for solar cell encapsulants
[NASA-CR-158741] N79-26494
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158735] N79-26495
Low cost solar array project: Composition measurements by analytical photon catalysis
[NASA-CR-158737] N79-26500
An investigation of the adhesive bonding of Teflon solar cell covers
[NASA-CR-159565] N79-26506
SOLAR COLLECTORS
Design investigation of solar powered lasers for space applications
[NASA-CR-159554] N79-26384
Analysis of flat mirror V-trough solar concentrator
N79-26472
Central receiver thermal power system
[AED-CONF-78-212-008] N79-26513
Design of a 150 kWe distributed collector solar thermal power station
[AED-CONF-78-212-013] N79-26517
Combined photovoltaic and thermal hybrid collector systems
[COO-4577-3] N79-26525
SOLAR ELECTRIC PROPULSION
Rendezvous missions to comets with electrically spacecraft
[TUM-LRT-TB-78/6-1] N79-26081
SOLAR ENERGY
Fuels from solar energy: Photosynthetic systems: State of the art and potential for energy production
[COO-4151-2] N79-26230
Method of construction of a multi-cell solar array
[NASA-CASE-MFS-23540-1] N79-26475
Vertical axis wind turbine status
[SAND-78-0397C] N79-26512
SOLAR ENERGY CONVERSION
Handbook of data on selected engine components for solar thermal applications
[NASA-TM-79027] N79-26476
Solar thermal power-conversion system
N79-26477
Power-conversion system component summation
N79-26483
Workshop on Ecological Impacts of Solar Energy Conversion
[COO-4339-4] N79-26522
Analysis of helio-thermoelectrical energy conversion efficiency
[REPT-77/HP-40-241] N79-26534
Elements for technological and economic modeling of tower-type solar power plants
[P/51/76/17] N79-26535
Cost/benefit analysis of a solar power plant supplemented by diesel generation in comparison with a solely diesel system - optimizing for size and initial investment in an isolated area --- energy technology
[P/51/77/21] N79-26536
Study of low output solar energy power plants
[P/51/77/24] N79-26537
SOLAR FURNACES
Study of low output solar energy power plants
[P/51/77/24] N79-26537
SOLAR GENERATORS
Design investigation of solar powered lasers for space applications
[NASA-CR-159554] N79-26384
A method for correlating performance data of a terrestrial solar cell array
[NASA-TM-79163] N79-26503
Design of a 150 kWe distributed collector solar thermal power station
[AED-CONF-78-212-013] N79-26517
Study of low output solar energy power plants
[P/51/77/24] N79-26537
SOLAR HOUSES
The new residence 1977 solar house design competition
[PB-293069/1] N79-26540
SOLAR PROPULSION
Design investigation of solar powered lasers for space applications
[NASA-CR-159554] N79-26384
SOLAR RADIATION
Evaluation of the effects of solar radiation on glass --- space environment simulation
[NASA-CR-161247] N79-26209
Solar radiation and valley breeze in the southern parts of the Alps
N79-26647
Time variations of sunshine and sun radiation in the eastern Alps region?
N79-26682
Global solar radiation in a vertical profile of the Carpathians
N79-26685
SOLAR RADIO EMISSION
Solar-geophysical data number 414 [supplement], February 1979. Part 1: Prompt Reports. Data for December 1978 - January 1979
[PB-294770/3] N79-27054
Solar-geophysical data number 414 [supplement], February 1979. Part 2: Comprehensive reports. Data for August - July 1978 and miscellanea
[PB-294771/1] N79-27055
Solar-geophysical data number 414 [supplement], February 1979: Explanation of data reports
[PB-294772/9] N79-27056
SOLAR TOTAL ENERGY SYSTEMS
System study on the feasibility of a coal-fired total-energy plant [with solar options] for Sandia Laboratories
[SAND-78-0979] N79-26530
SOLAR WIND
Magnetic dips in the solar wind
[NASA-TM-80477] N79-27053
Space Activities in 1977 --- Belgian research centers
N79-27063
SOLID ROCKET PROPELLANTS
Erosive burning of composite solid propellants: Experimental and modeling studies
[AD-A067649] N79-26227
SOLID SOLUTIONS
A study of metal-oxygen solid solutions utilizing solid electrolytic cells
N79-26160

High temperature deformation of solid solution strengthened superalloys — nickel-base Hastelloy alloy C-276 and cobalt-base Haynes alloy No. 188 N79-26165

SOLID STATE
Thermodynamic and kinetic investigations of liquid metal-oxygen systems using solid state electrochemical methods N79-26171

SOLID STATE DEVICES
Theory of solid state cyclotron maser [AD-A066174] N79-26389

SOLID SURFACES
Some applications of Green's functions to the study of the effects of surfaces on the dynamical properties of elastic solids N79-26973

SOLID WASTES
Thermogravimetric analysis of solid refuse-derived fuels and coal [AD-A067829] N79-26225
The production of ethanol from agricultural waste: An economic evaluation [PB-292552/7] N79-26233
Recovery, processing, and utilization of gas from sanitary landfills [PB-293165/7] N79-26235
A pilot study of the potential for Navy utilization of solid waste derived fuels to offset fossil fuels consumption [AD-A067165] N79-26510

SOLIDIFICATION
An investigation of duplex weld solidification in austenitic stainless steels N79-26158
Solidification behavior of type 308 stainless steel filler metal [ORNL-TM-6644] N79-26179

SOLIDIFIED GASES
NMR of dilute ortho-H[sub]2 impurities in solid para-H[sub] 2 at temperatures below 1K N79-26972

SOLIDS
Turbulent and fast fluidization [high velocity fluidization] N79-26348

SOLUBILITY
Diffusivity and solubility of nitrogen in multi-component liquid iron alloys containing alloying elements up to 50 wt% at 1600 C N79-26162
Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method — temperature dependence [NRC/CNR-TT-1942] N79-26173

SOLVENT EXTRACTION
Solvent removable coatings for contaminant protection of microcircuits [AD-A067745] N79-26212

SOLVENTS
A chemical theory for the thermodynamics of highly solvated liquid metal mixtures N79-26996

SONAR
Echo tracker/range finder for radars and sonars [NASA-CASE-NPO-14361-1] N79-26253
Decision problems in multistatic sonar systems [ISS-R-78/4] N79-26889

SOS [SEMICONDUCTORS]
Radiation hardened CMOS/SOS code generator for space applications [AD-A067980] N79-26327

SOUND DETECTING AND RANGING
Acoustic radar and its use in meteorology [TR-20] N79-26714

SOUND FIELDS
Aerodynamic sound generation due to vortex-aerofoil interaction. Part 2: Analysis of the acoustic field [NASA-CR-152231] N79-26883

SOUND LOCALIZATION
Decision problems in multistatic sonar systems [ISS-R-78/4] N79-26889

SOUND WAVES
Numerical solutions of underwater acoustic wave propagation problems [AD-A067023] N79-26887

SOUNDING ROCKETS
Some effects of vehicle flow field on the capture efficiency of a Gerdien capacitor atmospheric probe [AD-A067710] N79-26594

SOUNDS [TOPOGRAPHIC FEATURES]
The MESA Puget Sound Project, Seattle, Washington [PB-293906/4] N79-26560

SOYBEANS
Physiological effects of a high soybean protein diet in man N79-26777

SPACE CHARGE
On the limits of applicability of the space-charge-limited P-dot driver [AD-A066131] N79-26104
Gabor lens theory [BNL-25023] N79-26913
A fluid description of plasma double-layers [NASA-CR-158719] N79-26942

SPACE ENVIRONMENT SIMULATION
Evaluation of the effects of solar radiation on glass -- space environment simulation [NASA-CR-161247] N79-26209

SPACE HEATING [BUILDINGS]
The new residence 1977 solar house design competition [PB-293069/1] N79-26540

SPACE NAVIGATION
Flight Mechanics/Estimation Theory Symposium — with application to autonomous navigation and attitude/orbit determination [NASA-CP-2087] N79-26082

SPACE PROCESSING APPLICATIONS ROCKET
Evaluation of surface properties in SPAR electrophoresis — laxtex coatings and particle motion [NASA-CR-161248] N79-26136

SPACE RENDEZVOUS
Rendezvous missions to comets with electrically spacecraft [TUM-LRT-TB-78/6-1] N79-26081

SPACE SHUTTLES
Transfer trajectory design for a shuttle launched geosynchronous payload N79-26097
SCATS: SRB Cost Accounting and Tracking System handbook [NASA-TM-78302] N79-27002

SPACE TRANSPORTATION
Low cost space transportation [TUM-LRT-TB-78/6-2] N79-26108

SPACE TRANSPORTATION SYSTEM
Inertial Upper Stage [IUS] software analysis [NASA-CR-161251] N79-26107

SPACE-TIME FUNCTIONS
On the existence of solutions of nonlinear Volterra equations in abstract spaces [HTKK-MAT-A120/1978] N79-26855

SPACEBORNE EXPERIMENTS
INTELSAT 4 in orbit liquid slosh tests and problems in the theoretical analysis of the data N79-26091
Catalog of far-ultraviolet objective-prism spectrophotometry: Skylab experiment S-019, ultraviolet steller astronomy [NASA-RP-1031] N79-27057

SPACECRAFT CHARGING
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Research Association N79-26079

SPACECRAFT COMMUNICATION
Low noise devices for satellite communication systems [RAE-TR-78076] N79-26279

SPACECRAFT DESIGN
Low cost space transportation [TUM-LRT-TB-78/6-2] N79-26108

SPACECRAFT ENVIRONMENTS
Proceedings of workshops to define engineering requirements for a space vacuum research facility [NASA-CP-2091] N79-26076
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Res. Association N79-26080

SPACECRAFT LAUNCHING
Reliability and launching policy for a system of satellites [RAE-TR-78081] N79-26106

SPACECRAFT MOTION
Magnetic suspension and pointing system — on a carrier vehicle [NASA-CASE-LAR-11889-1] N79-26372

SPACECRAFT POWER SUPPLIES
A microprocessor sequencer for the UK T5 ion thruster and power conditioner unit [RAE-TR-78057] N79-26797

SPACECRAFT PROPULSION
General purpose rocket furnace [NASA-CASE-MFS-23460-1] N79-26075
Inert gas thrusters [NASA-CR-159527] N79-26110
Construction of a high performance resistojet for satellite propulsion [PERME-TR-99] N79-26112

SPACECRAFT SHIELDING
Proceedings of workshops to define engineering requirements for a space vacuum research facility [NASA-CP-2091] N79-26076
NASA workshop on outgassing N79-26078
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Research Association N79-26079
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Res. Association N79-26080

SPACELAB
Space Activities in 1977 — Belgian research centers N79-27063

SPATIAL DISTRIBUTION
Spatial and temporal fluctuations of precipitations within an intra-Alpine area as function of general atmospheric circulation [examples taken in Savoy] N79-26692
Spatial and temporal variations of the isotopic composition of precipitations at the Alps periphery N79-26695
Geographical distribution of ice formation in Liguria N79-26701

SPECIFIC HEAT
Specific heat of superconducting films of indium and of indium alloyed with magnetic impurities N79-26968

SPECIFICATIONS
Output capacity of the stored program control [SPC] commutation system [FUB-35-1977] N79-26271
Random vibration introduction: Environments, damaging effects, tests, test specifications and test economy [ECR-84] N79-26435

SPECKLE PATTERNS
Statistics of speckle propagation [AD-A067885] N79-26933

SPECTRA
Electrodisintegration of few-body systems and realistic interactions [ISS-P-78/11] N79-26901

SPECTRAL ENERGY DISTRIBUTION
Analysis of a model for the interpretation of chromatic delay in light emitting diodes [FUB-31-1977] N79-26338

SPECTRAL SIGNATURES
Large Area Crop Inventory Experiment [LACIE]. Signature extension in remote sensing [E79-10219] N79-26446
Frequency-variant optical signal processing N79-26928

SPECTROPHOTOMETRY
Blank corrections for ultratrace atomic absorption analysis [AD-A066979] N79-26893

SPECTROSCOPIC ANALYSIS
Characterization of a Fabry-Perot interferometer and a dc arc plasma jet for spectrochemical analysis [IS-T-815] N79-26144
Investigation of infrared spectra of atmospheric gases to support stratospheric spectroscopic investigations [NASA-CR-158716] N79-26586
Surface studies of group IV-VI layered crystals N79-26967
Studies of high-dose ion implantation in silicon — differential resistivity, Hall effect, and spectroscopic analysis N79-26975

SPECTROSCOPY
Detection and measurements of air pollutants and constituents by millimeter-wave microwave spectroscopy [LBL-7986] N79-26544

SPECTRUM ANALYSIS
Accurate chemical characterization by fluorescence spectrometry N79-26126
Scanner development [AD-A066902] N79-26390
An impedance technique for determining low-frequency payload environments [NASA-CR-3143] N79-26428
Certain characteristics of the atmospheric turbidity N79-26623
Beam foil spectroscopy of heavy ions at energies from 20 to 238 MeV [BNL-24909] N79-26916

SPECULAR REFLECTION
Advanced multidither coat studies [AD-A068005] N79-26932

SPEECH RECOGNITION
The use of rhymed polysyllabic words in studying aural intelligibility indoors [FUB-30-1977] N79-26270
Description of main methodologies used for speaker recognition [FUB-1-1978] N79-26274
Automatic speaker recognition: Considerations on an adequate methodology to solve the problem [FUB-10-1978] N79-26285
Subjective speaker recognition: Statistical consideration on attainable results significance [FUB-17-1978] N79-26287

SPEED CONTROL
Speed reducers-increasers N79-26481

SPIN STABILIZATION
Spin axis tilt of satellite induced by the internal fluid migration [NASDA-TR-8] N79-26103

SPIN-LATTICE RELAXATION
Renormalization group transformations for 7-spin triangular lattice
N79-26969

SPLINE FUNCTIONS
Spline regression algorithms and local dependence
[AD-A067248] N79-26846

SPRINGS (ELASTIC)
Single disc springs: Elastic deflections, stresses, stiffnesses and resiliences
[ESDU-78043] N79-26421

SPUTTERING
The properties of indium gallium antimonide thin films deposited by multitarget rf sputtering
N79-26155
Angular effects in the sputtering of stainless steel by hydrogen ions
[GA-A-15124] N79-26185
Physical processes in directed ion beam sputtering
[NASA-CR-159567] N79-26943
Crystal growth and electrical properties of sputtered indium gallium antimonide thin films
N79-26974

STABILITY
Destruction of cyclotron resonances in weakly collisional, inhomogeneous plasmas
[AD-A067827] N79-26596
Stable discrete adaptive control
[AD-A067812] N79-26831
The stability of second order quadratic differential equations, part 2
[AD-A067813] N79-26851

STAINLESS STEELS
The effect of environmental variables on the pitting corrosion behavior of single and duplex phase 304L stainless steel
N79-26157
Solidification behavior of type 308 stainless steel filler metal
[ORNL-TM-6644] N79-26179
Angular effects in the sputtering of stainless steel by hydrogen ions
[GA-A-15124] N79-26185
Effects of notches on elevated-temperature, low-cycle fatigue behavior of type 204 stainless steel
[CONF-781202-25] N79-26434

STANDARDIZATION
Blank corrections for ultratrace atomic absorption analysis
[AD-A066979] N79-26893

STANDARDS
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 1: Non-military standards and national regulations. Survey of international and national standards and regulations on electrical interference and susceptibility
[ECR-79-PT-1] N79-26268
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 2: Military and special industrial standards, regulations, and reccomendations international and national standards, regulations, and recommendations on electrical interference and susceptibility
[ECR-80-PT-2] N79-26269
Activities of the Division of Quantum Metrology
[NPL-QU-AR-76] N79-26736

STAR TRACKERS
Autonomous attitude estimation via star sensing and pattern recognition
N79-26088

STARS
Investigations of distant field stars and clusters in the galactic anticenter
N79-27040

STATIC LOADS
Evaluation of flawed composite structural components under static and cyclic loading --- fatigue life of graphite-epoxy composite materials
[NASA-CR-135403] N79-26120

STATIC TESTS
Effect of several geometric parameters on the static internal performance of three nonaxisymmetric nozzle concepts
[NASA-TP-1468] N79-26022

STATISTICAL ANALYSIS
An experimental comparison of the readability of two digital altimeters
[ARL/SYS-NOTE-60] N79-26053
Determination of the statistical properties of the digital sum of line codes to evaluate the relative average increase in error probability due to low frequency distortion in data transmission
[FUB-3-1978] N79-26281
Automatic speaker recognition: Considerations on an adequate methodology to solve the problem
[FUB-10-1978] N79-26285
Statistical analysis of precipitations in the French Alps
N79-26693
Probability and productivity of important snowfalls in the mountains, particularly in the region of Davos
N79-26699
Severe storms research
[PB-294129/2] N79-26749

STATISTICAL DISTRIBUTIONS
Large Area Crop Inventory Experiment [LACIE]. Signature extension in remote sensing
[E79-10219] N79-26446
Two concepts of positive dependence, with applications in multivariate analysis
[AD-A067545] N79-26848
Redundancy analysis and associated asymptotic distribution theory
N79-26865

STATIST ICAL MECHANICS
Symmetries and statistical behavior in fermion systems
[COO-2171-184] N79-26895

STATISTICAL TESTS
Approximate tests of hypotheses in regression models with grouped data
[AD-A066926] N79-26845

STATOR BLADES
The influence of compressor inlet guide vane/stator relative circumferential positioning on blade wake transport and interaction
[AD-A067969] N79-26060

STEADY FLOW
Numerical solution of a steady, viscous, axisymmetric cavity-flow problem
[NPL-DNACS-12/79] N79-26368

STEELS
The role of mold atmospheres in the penetration of molten steel into sand molds
N79-26163
A study of the experimental implementation and the resulting characteristic behavior of the J-integral fracture toughness parameter applied to two controlled-rolled steels
N79-26170
Critical experiments, measurements and analyses to establish a crack arrest methodology for nuclear pressure vessel steels
[PB-292777/0] N79-26198

STELLAR MASS EJECTION
The solution of two dimensional problems in astrophysics
N79-27047

STELLAR SPECTROPHOTOMETRY
Investigations of distant field stars and clusters in the galactic anticenter
N79-27040
Catalog of far-ultraviolet objective-prism spectrophotometry: Skylab experiment S-019, ultraviolet steller astronomy
[NASA-RP-1031] N79-27057

STIRLING CYCLE
Feasibility study of automative Stirling engine heaters
[R77-719021] N79-26403
Stirling engine characteristics
N79-26480
Candidate power-conversion system cycles, appendix A
N79-26484
Low-power baseline test results for the GPU 3 Stirling engine
[NASA-TM-79103] N79-27023

STOCHASTIC PROCESSES
A stochastic model for an intermittent hydrologic process
N79-26438
Determination of the seismic design parameters: A stochastic approach
N79-26585
Stochastic and adaptive systems
[AD-A067598] N79-26830
A general martingale approach to diacrete time stochastic control and estimation
[AD-A067834] N79-26852
The one-on-one stochastic duel, parts 1 and 2 --- bibliographies
[AD-A068008] N79-26869
Estimator performance for a class of nonlinear estimation problems
[AD-A067661] N79-26870
Simultaneous quantum mechanical observations and nonlinear quantum stochastic filter
N79-26877

STOICHIOMETRY
Growth and homogeneity characterization of mercury cadmium telluride crystals
[AD-A067670] N79-26990

STOKES FLOW
A numerical solution technique for three-dimensional multiparticle Stokes flows
N79-26345

STORAGE STABILITY
Stability evaluation of ambient concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide contained in compressed gas cylinders
[PB-292749/9] N79-26153

STORMS
Lake-effect storms of Lake Ontario
N79-26616
National severe local storms operations plan
[PB-294326/4] N79-26745

STORMS (METEOROLOGY)
A contribution to the severe storms intercept project, 1978
[PB-293472/7] N79-26741
Research on severe local storms --- corona probe to measure electric fields at earth surface
[PB-293924/7] N79-26748
Severe storms research
[PB-294129/2] N79-26749
Record winter storms in Illinois, 1977 - 1978
[PB-293181/4] N79-26752

STRAIN GAGES
Fabrication of manganin stress gauges for use in detonating high explosives
[UCRL-81371] N79-26377

STRAIN RATE
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208
Elastic-plastic tension-torsion in a circular bar of rate-sensitive material
[OUEL-1265/78] N79-26436

STRATEGY
Reliability and launching policy for a system of satellites
[RAE-TR-78081] N79-26106

STRATIFICATION
Fuel motion and pollutant formation in stratified charge combustion
[UCRL-81155] N79-26150

STRATIFIED FLOW
A study of inflow characteristics in a stratified fluid
N79-26349

STRATOSPHERE
An investigation of the interaction, evolution and maintenance of the large-scale waves in the stratosphere and troposphere
N79-26584
Investigation of infrared spectra of atmospheric gases to support stratospheric spectroscopic investigations
[NASA-CR-158716] N79-26586
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
The intertropical convergence zone experiment: Background and summary
N79-26716
Operational activities
N79-26717
Notes on the meteorology of the intertropical convergence zone during the July 1977 experiment
N79-26718
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment
N79-26719
Measurement of NO and O3 from aircraft: 1977 tropical convergence zone experiment
N79-26720
Trace constituent mixing ratios in the lower stratosphere during the 1977 intertropical convergence zone experiment
N79-26721
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment
N79-26722
Stratospheric aerosols in the intertropical convergence zone, Panama Canal zone
N79-26725
Space Activities in 1977 --- Belgian research centers
N79-27063

STREAMS
FEDBAK03: A computer program for the modeling of first order consecutive reactions with feedback under a steady state multidimensional natural aquatic system. Program documentation and user's guide
[PB-292760/6] N79-26553

STRESS ANALYSIS
Online monitoring of compressor blade stress: An improved system
[AD-A067403] N79-26061
Design charts for torsional properties of non-circular shafts --- stress analysis
[AD-A064109] N79-26401
Investigations into the mechanical behavior of composite bolted joints
[NASA-CR-158752] N79-26402
Single disc springs: Elastic deflections, stresses, stiffnesses and resiliences
[ESDU-78043] N79-26421

STRESS CORROSION
The effect of grain structure on the stress corrosion resistance of Al-Zn-Mg-Cu alloys
[RAE-TR-78034] N79-26193

STRESS CORROSION CRACKING
Stress corrosion cracking of high strength Al-Zn-Mg-Cu alloys: Matrix precipitation
[RAE-TR-78110] N79-26174

STRESS RELAXATION
Stress relaxation in coiled ribboms of Fe40Ni40P14B6 and Fe29Ni49P14B6Si2
[AD-A068000] N79-26432

STRESS RELIEVING
Quantitative comparison of electronic component-solder joint stress relief in encapsulated assemblies
[BDX-613-1868-REV] N79-26333
STRESS-STRAIN DIAGRAMS
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208
STRIP MINING
Remote sensing program
[E79-10211] N79-26440
STRUCTURAL ANALYSIS
Design charts for torsional properties of non-circular shafts --- stress analysis
[AD-A064109] N79-26401
Study of base plates for axially loaded columns
N79-26423
Warping torsion of reinforced concrete beams with thin-walled open sections
N79-26424
Polyethylene deformation analysis
N79-26425
APES-finite element fracture mechanics analysis revised documentation
[AD-A066246] N79-26430
STRUCTURAL BASINS
Zones of convergence in local air flow in valleys and basins
N79-26648
STRUCTURAL DESIGN
Structural design of flexible pavement. Part 1: Summary of performance
[PB-292787/9] N79-26245
Design of a 150 kWe distributed collector solar thermal power station
[AED-CONF-78-212-013] N79-26517
The new residence 1977 solar house design competition
[PB-293069/1] N79-26540
Information base for waste repository design. Volume 7: Executive summary
[PB-293407/3] N79-26927
Integrated systems: A modern trend in the development of automated design systems
N79-27065
STRUCTURAL STABILITY
Structural dynamics, stability and control of high aspect ratio wind turbine generators
N79-26471
STRUCTURAL VIBRATION
Wind excited motion of buildings
N79-26239
STRUCTURAL WEIGHT
An impedance technique for determining low-frequency payload environments
[NASA-CR-3143] N79-26428
SUBMILLIMETER WAVES
Airborne infrared and submillimeter astronomical polarization measurements at different wavelengths --- C-141 observations
[NASA-CR-158751] N79-27044
SUBROUTINE LIBRARIES [COMPUTERS]
Use of a single function subroutine for multi-region ionospheric profiles with a versatile three-dimensional ray tracing program
[UIO-SR-78-03] N79-26599
Numerical software support for the fusion energy program at Oak Ridge
[CONF-780763-1] N79-26955
SUBSONIC FLOW
Alternate subsonic low-cost engine
[AD-A067277] N79-26058
SUBSONIC SPEED
Aerodynamic characteristics of the close-coupled canard as applied to low-to-moderate swept wings. Volume 2: Subsonic speed regime
[AD-A067122] N79-26025
SUBSTRATES
Plated copper substrates for the LASL Antares CO2 laser system --- mirror design
[LA-UR-79-9] N79-26397
SULFATES
Association between meteorological conditions and high ozone and sulfate concentrations: A 1974 episode in the Eastern United States
[PB-293485/9] N79-26611
SULFONES
The preparation and characterization of elastomers containing pendent sulfonic acid derivatives
N79-26206
SULFUR DIOXIDES
Stability evaluation of ambient concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide contained in compressed gas cylinders
[PB-292749/9] N79-26153
Control of sulfur dioxide and particulate emission in MHD power systems using high sulfur coal
[CONF-781109-18] N79-26546
SUMMER
Radiation balance at 2 high-altitude Alpine stations during the vegetation period
N79-26686
SUN
Gravitational time delay in orthogonally polarized radiation passing by the sun
[NASA-CR-158757] N79-27049
SUNLIGHT
Time variations of sunshine and sun radiation in the eastern Alps region?
N79-26682
Time and space variability of sunshine duration in mesoscale
N79-26684
SUPERCONDUCTING MAGNETS
SLPX: Superconducting long-pulse tokamak experiment --- magnetics system
[PPPL-1488] N79-26947
Stability calculations for MHD magnets
[CONF-781055-4] N79-26960
SUPERCONDUCTIVITY
Harmony in science: Superconductivity and high energy physics
[SLAC-PUB-2237] N79-26905
SUPERCONDUCTORS
Metastable superconducting alloys
[CALT-822-104] N79-26181
Properties of superconducting Nb3Si
[BNL-24949] N79-26330
Initiation and propagation of normal zones in a force-cooled tubular superconductor
[LA-UR-78-2481] N79-26331
Upper critical magnetic field of superconducting films with magnetic impurities
N79-26962
Electronically induced phase transformations --- in rare earth superdonducting compounds
[AD-A067066] N79-26983
SUPERCRITICAL FLOW
Initiation and propagation of normal zones in a force-cooled tubular superconductor
[LA-UR-78-2481] N79-26331
SUPERGIANT STARS
High angular resolution observations of the circumstellar OH masers surrounding supergiant stars
N79-27042
SUPERHIGH FREQUENCIES
Relationship between raingauge tipping volume and rain rate distributions
[FUB-32-1977] N79-26739
SUPERSONIC FLOW
Pulsed-laser-generated impulse on a surface in supersonic flow
[LOG-J-10741] N79-26012
Bumblebee program aerodynamic data. Part 3: Pressure fields at Mach numbers 1.5 to 2.0 --- for supersonic guided missiles
[NASA-CR-3116] N79-26021
Lifting bodies derived from supersonic flows past inclined circular and elliptic cones
[AD-A068003] N79-26026
Supersonic flow past conical bodies with nearly circular cross sections
[AD-A068004] N79-26027
SURFACE ENERGY
Effects of surface states on the low frequency transfer inefficiency in CCD's
N79-26302
SURFACE PROPERTIES
Evaluation of surface properties in SPAR electrophoresis --- laxtex coatings and particle motion
[NASA-CR-161248] N79-26136
A study of an electrodeless glow discharge as a means of modifying the surface of polymers
[PB-293570/8] N79-26220
Effects of surface states on the low frequency transfer inefficiency in CCD's
N79-26302
Equipment for a laser surface measuring system
[BDX-613-1848-REV] N79-26398
SURFACE REACTIONS
Pulsed-laser-generated impulse on a surface in supersonic flow
[LOG-J-10741] N79-26012
Effect of fission product interactions on the corrosion and mechanical properties of HTGR alloys
[BNL-NUREG-25325] N79-26180
Some applications of Green's functions to the study of the effects of surfaces on the dynamical properties of elastic solids
N79-26973
SURFACE ROUGHNESS
Structural design of flexible pavement. Part 1: Summary of performance
[PB-292787/9] N79-26245
SURFACE STABILITY
Stability of the critical surface in the presence of strong electromagnetic radiation
N79-26940
SURFACE TEMPERATURE
Temperature and cloudiness correlation in the region of Alps
N79-26661
SURFACE WATER
Water resources data for Indiana, water year 1977
[PB-292256/5] N79-26450
SURFACE WAVES
The propagation of surface shear waves. Volume 1: Theory
N79-26277
The propagation of surface shear waves. Volume 2: Experiments
N79-26278
SURVEYS
Description of main methodologies used for speaker recognition
[FUB-1-1978] N79-26274
A summary of the regional tectonics and seismicity of eastern Kansas; summary of project activities and results to the end of the second year, or September 10, 1979
[PB-293661/5] N79-26610
The least squares adjustment of errors in level surveys
[NPL-DNACS-9/78] N79-26862
SUSPENDING [MIXING]
Experimental measurements of the behavior of non dilute particle suspensions in turbulent flow
N79-26353
SWEDEN
The IMI network in Sweden: Present equipment, methods, and plans for improvement
[AC-40] N79-26740
SWEPT WINGS
Aerodynamic characteristics of the close-coupled canard as applied to low-to-moderate swept wings. Volume 2: Subsonic speed regime
[AD-A067122] N79-26025
SWITCHES
Switching in optical channel waveguides
N79-26930
SWITCHING CIRCUITS
Vacuum arc switched inverters
N79-26304
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
High voltage, low inductance hydrogen thyratron study program
[AD-A067178] N79-26319
SWITCHING THEORY
A perturbation method for the periodic solutions of a discontinuous system of differential equations
N79-26837
SWITZERLAND
Fine-mesh numerical forecasting in Switzerland
N79-26667
A poster: Meteorological experiments in the framework of the 4th large-scale hail suppression test in Switzerland
N79-26707
SYLLABLES
The use of rhymed polysyllabic words in studying aural intelligibility indoors
[FUB-30-1977] N79-26270
SYMMETRY
Symmetries and statistical behavior in fermion systems
[COO-2171-184] N79-26895
SYNOPTIC METEOROLOGY
Synoptic analysis of an Alpine weather map
N79-26631
Objective regional forecast for the Bernese Alps
N79-26635
Investigation of water table on the Kesselwandferner [Oetztal Alps] in a 30 m deep firn pit, a synopsis
N79-26690
SYNTAX
An implementation of a system for the formal definition of programming languages
N79-26804
SYNTHETIC FUELS
Fuel hydrogen content as an indicator of radiative heat transfer in an aircraft gas turbine combustor
[AD-A067709] N79-26224
Relative chemical composition of selected synthetic crudes
[CONF-781150-4] N79-26231
The production of ethanol from agricultural waste: An economic evaluation
[PB-292552/7] N79-26233
SYSTEMS ANALYSIS
Reliability and launching policy for a system of satellites
[RAE-TR-78081] N79-26106
Analyses of reframing performance of multilevel synchronous time division multiplex hierarchy
N79-26247
Nonlinear system analysis in bipolar integrated circuits
N79-26296
Dynamic analysis and design sensitivity analysis of mechanisms with intermittent motion
N79-26399
Feasibility study of satellite-borne lidar global wind monitoring system
[PB-293879/3] N79-26746
Analytical methods for biotechnological design of man machine systems: Work on system ergonomy
[FB-28] N79-26787

Fault simulation, analysis and diagnosis of a microprocessor
N79-26790
Stochastic and adaptive systems
[AD-A067598] N79-26830
A state space approach to hierarchical systems
N79-26872

SYSTEMS ENGINEERING
System design requirements for advanced rotary-wing agricultural aircraft
[NASA-CR-158938] N79-26046
Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067
Feasibility study for a numerical aerodynamic simulation facility. Volume 2: Hardware specifications/descriptions
[NASA-CR-152288] N79-26069
Proceedings of workshops to define engineering requirements for a space vacuum research facility
[NASA-CP-2091] N79-26076
Proceedings of workshops to define engineering requirements for a space vacuum research Facility: Summary
N79-26077
NASA workshop on outgassing
N79-26078
Computer-aided design of microwave integrated parametric amplifiers
N79-26306
An accurate reliability modeling technique for hybrid modular reduadant digital systems using modular characteristic error parameters
N79-26413
Contour measurement system
[NASA-CASE-MFS-23726-1] N79-26439
Development of a process for a high capacity arc heater production of silicon for solar arrays
[NASA-CR-158745] N79-26499
Central receiver thermal power system
[AED-CONF-78-212-008] N79-26513
Steam generator component studies with RELAP4/MOD6
[CVAP-TR-78-019] N79-26526
A study of the construction of a distributive processing system using standard components
N79-26791
SLPX: Superconducting long-pulse tokamak experiment --- magnetics system
[PPPL-1488] N79-26947

SYSTEMS STABILITY
Computation of the equilibrium points in an electric network with many machines
[FUB-2-1978] N79-26340
On the stability and convergence of self-tuning algorithms
[OUEL-1259/78] N79-26833

T

TABLES [DATA]
Thule Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-131-6] N79-26601
Thule Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-132-4] N79-26602
Thule Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-133-2] N79-26603
Godhavn Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-128-6] N79-26604
Godhavn Geophysical Ooservatory: Magnetic results, 1972
[ISBN-87-7478-129-4] N79-26605
Godhavn Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-130-8] N79-26606
Rude Skov Geophysical Observatory: Magnetic results, 1975
[ISBN-87-7478-149-9] N79-26607
Rude Skov Geophysical Observatory: Magnetic results, 1976
[ISBN-87-7478-150-2] N79-26608
Expansions in series of Chebyshev polynomials of a function occuring in linear unsteady aerodynamic theory
[RAE-TR-77110] N79-26871

TAIL ASSEMBLIES
Optimum tail fairings for bodies of revolution --- computerized design
[AD-A067927] N79-26031

TANK TRUCKS
Radio frequency liquid level gauging in propane tank car safety tests: A feasibility study
[PB-292978/4] N79-26381

TARGET RECOGNITION
A Gaussian noise analysis of the pseudo-coherent discriminant
[AD-A067103] N79-26258
The use of models in image analysis
[AD-A067166] N79-26448

TASK COMPLEXITY
Study of modeling and evaluation of remote manipulation tasks with force feedback
[NASA-CR-158721] N79-26785
Analytical methods for biotechnological design of man machine systems: Work on system ergonomy
[FB-28] N79-26787

TDR SATELLITES
Short-term solar pressure effect and GM uncertainty on TDRS orbital accuracy: A study of the interaction of modeling error with tracking and orbit determination
N79-26096

TEARING
The tearing of weathered rubber-coated fabrics
[RAE-TR-78005] N79-26218
Tearing instability of elastic-plastic crack growth
N79-26419

TECHNOLOGICAL FORECASTING
Computer sciences and technology: Computer peripheral memory system forecast
[PB-294148/2] N79-26799
Technology assessment and forecast report
[PB-293380/2] N79-27030

TECHNOLOGY ASSESSMENT
Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067
Comparison of different techniques for producing hydrogen: Production costs analysis
[P/51/76/14] N79-26240
LLL wind energy studies [OAHU]
[UCRL-82171] N79-26514
Analysis of helio-thermoelectrical energy conversion efficiency
[REPT-77/HP-40-241] N79-26534
Study of low output solar energy power plants
[P/51/77/24] N79-26537
The microprocessor and its application in a laboratory environment
[RAE-TM-IT-165] N79-26798
Information technology and governmental reorganization: Summary of the Federal Data Processing Reorganization Project
[PB-294543/4] N79-26800
Laser fusion: Status, future, and tritium control
[UCRL-81946] N79-26950
Annual report to the Congress for 1978 --- technology assessment
[PB-293088/1] N79-27027
Technology assessment and forecast report
[PB-293380/2] N79-27030
Integrated systems: A modern trend in the development of automated design systems
N79-27065

TECHNOLOGY TRANSFER
AID's remote sensing grant program
[PB-292872/9] N79-26456
SEMTAP: A new technology transfer network to link business and industry with Federal research and development --- energy technology
[PB-292882/8] N79-27026
Management of federal R and D for commercialization: Executive summary
[PB-292851/3] N79-27036
Management of federal R and D for commercialization
[PB-292852/1] N79-27037
Management of federal R and D for commercialization: Appendices: Supporting documentation
[PB-292853/9] N79-27038
CSIR annual report, 1978 --- research and development activities in the Republic of South Africa
[AR-34] N79-27061

TECHNOLOGY UTILIZATION
Air cushion landing gear applications study
[NASA-CR-159002] N79-26045
A study of the experimental implementation and the resulting characteristic behavior of the J-integral fracture toughness parameter applied to two controlled-rolled steels
N79-26170
The applications of the GISS Vidicon system: Selected topics in astrophysics
N79-27041

TECTONICS
Relief of the Ocean floor and the new global tectonics
N79-27067

TEFLON [TRADEMARK]
An investigation of the adhesive bonding of Teflon solar cell covers
[NASA-CR-159565] N79-26506

TELECOMMUNICATION
Design of VHF and UHF communications air/ground antennas
[AD-A067307] N79-26254
Output capacity of the stored program control [SPC] commutation system
[FUB-35-1977] N79-26271
A method for the formal description of signaling systems
[FUB-4-1978] N79-26282
EMS [Electronic Message Service]: System definition and evaluation. Executive summary
[PB-292933/9] N79-26291
EMS [Electronic Message Service]: System definition and evaluation
[PB-292934/7] N79-26292
Telehealth handbook: A guide to telecommunications technology for rural health care
[PB-292557/6] N79-26778

TELEPHONY
Report on collaboration activity between the 'Istituto Superiore Poste e Telecomunicazioni' and the Ugo Bordoni Foundation in 1977
N79-26275

TELEVISION RECEIVERS
Radiation safety in the use of color television sets
[ISS-T-77/4] N79-26276

TEMPERATURE
Thermogravimetric analysis of solid refuse-derived fuels and coal
[AD-A067829] N79-26225
The relationship of the thermal regime of the soil to the extrinsic environment, with special reference to the north central United States
N79-26582

TEMPERATURE DEPENDENCE
Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method --- temperature dependence
[NRC/CNR-TT-1942] N79-26173

TEMPERATURE DISTRIBUTION
Local and average heat transfer characteristics for turbulent air flow in an asymmetrically heated tube
N79-26357

TEMPERATURE EFFECTS
Evolution of the properties and structure of 17Cr-13Ni-Mo very low carbon austenitic stainless steel during high temperature exposure --- fast nuclear reactors
N79-26188
Pressurized water electrolysis test circuit: Initial operating results
[P/539/77/12] N79-26335
A study of inflow characteristics in a stratified fluid
N79-26349
Jet simulation techniques: Simulation of temperature effects by altering gas composition
[AD-A067084] N79-26362
Wear properties of dry bearing liners at ambient and elevated temperatures: A preliminary survey
[RAE-TR-78063] N79-26407
Quantitative evaluation of the complex thermal effects on climatic therapy
N79-26651

TEMPERATURE GRADIENTS
High-cycle fatigue behavior of a cobalt-based eutectic alloy
N79-26161
Spring in the Alps: A study of temperature increase
N79-26660

TEMPERATURE MEASUREMENT
Simultaneous measurements from three motor-gliders of temperature and humidity horizontal distribution in a cross-section of the Inn Valley east of Innsbruck under condition of mountain and valley winds circulation
N79-26677
Airborne pressure and temperature measurements during the 1977 intertropical convergence zone experiment
N79-26727
Pressure and temperature measurements from the U-2 aircraft during the 1977 intertropical convergence experiment
N79-26728
Activities of the Division of Quantum Metrology
[NPL-QU-AR-76] N79-26736
Temperature measurements in the TORMAC 4-c plasma
[LBL-8166] N79-26959

TENSILE STRENGTH
Heavy plate of quenched and tempered steel with 80kg/mm2 tensile strength
[PB-292929/7] N79-26199

TENSILE STRESS
Elastic-plastic tension-torsion in a circular bar of rate-sensitive material
[OUEL-1265/78] N79-26436

TERMINAL GUIDANCE
Fuel-conservative guidance system for powered-lift aircraft
[NASA-TM-78595] N79-26009

TERMINOLOGY
International science indicators: Development of indicators of international scientific activity using the science citation index
[PB-293033/7] N79-27020

TERNARY ALLOYS
Lattice parameters of iron-aluminum silicon alloys with the DO3 structure
[IS-T-831] N79-26992

TERNARY SYSTEMS
Thermodynamic studies of ternary mixtures by gas-liquid chromatography
N79-26124

Liquid-vapor equilibrium measurement and prediction of the binary and ternary systems consisting of methane, ethane, and carbon dioxide at 270.00 K
N79-26130
Electronically induced phase transformations --- in rare earth superdonducting compounds
[AD-A067066] N79-26983
TEST FACILITIES
Evaluation of a simplified gross thrust calculation technique using two prototype F100 turbofan engines in an altitude facility
[NASA-TP-1482] N79-26057
Feasibility study for a numerical aerodynamic simulation facility. Volume 1
[NASA-CR-152287] N79-26068
Feasibility study for a numerical aerodynamic simulation facility. Volume 2: Hardware specifications/descriptions
[NASA-CR-152288] N79-26069
Sandia laboratory combustion simulation facility --- for analyzing the flow of high temperature combustion products
[SAND-78-2240] N79-26146
Coal liquefaction test center
[FE-1517-67] N79-26226
ORNL PWR-BDHT two-phase flow instrumentation and analysis improvements
[CONF-781146-9] N79-26366
TEXAS
An evaluation of the bird/aircraft strike hazard Dyess Air Force Base, Texas
[AD-A068026] N79-26039
TEXTILES
Stress relaxation in coiled ribboms of Fe40Ni40P14B6 and Fe29Ni49P14B6Si2
[AD-A068000] N79-26432
THEMATIC MAPPING
Onboard image processing
N79-26083
THEOREM PROVING
On the boundary value problem u second derivative + u = 1/alpha u + p[t] u[0] = 0 = n [pi0
N79-26857
THERAPY
Quantitative evaluation of the complex thermal effects on climatic therapy
N79-26651
THERMAL CONDUCTIVITY
CTD observations off the coast of Peru, R/V Melville, 4 March - 22 May 1977, and R/V Columbus Iselin, 5 April - 19 May 1977
[PB-293377/8] N79-26761
THERMAL DEGRADATION
Degradation mechanism of Nb3Sn composite wires under tensile strain at 4.2 K
[BNL-24957] N79-26184
THERMAL ENERGY
A thermal activation analysis of cyclic creep in Al-4.6% Mg
N79-26418
Handbook of data on selected engine components for solar thermal applications
[NASA-TM-79027] N79-26476
Solar thermal power-conversion system
N79-26477
Power-conversion system component summation
N79-26483
Combined photovoltaic and thermal hybrid collector systems
[COO-4577-3] N79-26525
System study on the feasibility of a coal-fired total-energy plant [with solar options] for Sandia Laboratories
[SAND-78-0979] N79-26530
THERMAL EXPANSION
Thermodynamic characterization of liquid metals at high temperature by isobaric expansion measurements --- platinum
[UCRL-80114] N79-27000
THERMAL FATIGUE
Thermal fatigue of oxidation resistant overlay coatings for superalloys
N79-26156
THERMAL MAPPING
Atlas of infrared imagery of the sea surface
[AD-A067731] N79-26756
THERMAL PLASMAS
Effects of suprathermal fusion particles in Tokamak plasmas
N79-26939
THERMIONIC CONVERTERS
Theory of thermionic energy converter with variable plasma electron temperature
[COO-2533-10] N79-26521
THERMODYNAMIC PROPERTIES
Laser assisted semiconductor device processing --- energy transfer, thermal properties, and photon absorption
[AD-A067183] N79-26988
A chemical theory for the thermodynamics of highly solvated liquid metal mixtures
N79-26996
Thermodynamic properties of uranium-mercury system
[IS-T-824] N79-26999
THERMODYNAMICS
Thermodynamic and kinetic investigations of liquid metal-oxygen systems using solid state electrochemical methods
N79-26171
Second principle of thermodynamics, direction of heat flow and Fourier inequality: A comparative assessment
[OUEL-1255/78] N79-26369
Computer-aided investigation of reaction path synthesis
N79-26891
Thermodynamics and mechanisms of sintering
[LBL-8419] N79-26998
THERMOELASTICITY
Some new results in the second-order theory of nonlinear thermoelasticity
N79-26426
THERMOGRAVIMETRY
Thermogravimetric analysis of solid refuse-derived fuels and coal
[AD-A067829] N79-26225
THERMOHYDRAULICS
Heat transfer mediums
[P-52/D-08/77-10] N79-26367
THERMOLUMINESCENCE
A preliminary study on the dosimetric properties of CaSO4: Dyribbon [TLD-900]
[ISS-P-78/14] N79-26902
THERMONUCLEAR POWER GENERATION
Department of Energy policy for fusion energy
[DOE/ER-0018] N79-26952
THERMOPHYSICAL PROPERTIES
Thermodynamic characterization of liquid metals at high temperature by isobaric expansion measurements --- platinum
[UCRL-80114] N79-27000
THERMOPLASTIC RESINS
Thermoplastic materials: Water electrolysis
[P/539/77/06] N79-26152
THICKNESS
Prototype development of an optimized, tapered-thickness, graphite/epoxy composite flywheel
[UCRL-52623] N79-26121
THIN FILMS
Growth and structure of ion beam sputtered thin films of gold and cadmium sulfide on silicon substrate
N79-26131
The properties of indium gallium antimonide thin films deposited by multitarget rf sputtering
N79-26155
Structure of 001 grain boundaries in bicrystalline thin films of gold
N79-26166
Fresnel zone lens fabricated by electron beam lithography in thin film waveguide
N79-26305
Ultraviolet damage resistance of laser coatings
[LA-UR-78-2607] N79-26396
Optical transmission characterization of flash evaporated amorphous Se-Ge films
N79-26929
Crystal growth and electrical properties of sputtered indium gallium antimonide thin films
N79-26974
Study of electronic transport and breakdown in thin insulating films
[AD-A066918] N79-26984
THIN PLATES
Slicing of silicon into sheet material: Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158732] N79-26979
THREE DIMENSIONAL BOUNDARY LAYER
Three-dimensional boundary layers on bodies of revolution at incidence
N79-26350
Capacitance matrix methods for the Helmholtz equation on general three-dimensional regions
[COO-3077-155] N79-26853
THREE DIMENSIONAL FLOW
Control of forebody three-dimensional flow separations
[NASA-TM-78593] N79-26014
A numerical solution technique for three-dimensional multiparticle Stokes flows
N79-26345
THREE DIMENSIONAL MOTION
Determination of the seismic design parameters: A stochastic approach
N79-26585
THROMBOSIS
Effects of dietary fats on atherosclerosis and thrombosis
N79-26776
THRUST
Thrust and mass flow characteristics of four 36 inch diameter tip turbine fan thrust vectoring systems in and out of ground effect
[NASA-CR-152239] N79-26056
THRUST MEASUREMENT
Evaluation of a simplified gross thrust calculation technique using two prototype F100 turbofan engines in an altitude facility
[NASA-TP-1482] N79-26057
THUNDERSTORMS
An objective analysis of the climatological parameters of thunderstorm activity over the Rumanian Carpathians
N79-26705
Climatology of thunderstorms and hail in Austria
N79-26706
THYRATRONS
High voltage, low inductance hydrogen thyratron study program
[AD-A067178] N79-26319
TIDAL WAVES
Partially annotated tidal marsh bibliography. Second edition: Selected key work index
[PB-293466/9] N79-26760
TILTING ROTORS
A wind-tunnel investigation of tilt-rotor gust alleviation systems
[NASA-CR-152264] N79-26062
TIME
Time and space variability of sunshine duration in mesoscale
N79-26684
The effect of ground relief upon the extreme values of intensity and duration of precipitation in Belgium. Methods and results
N79-26697
TIME DEPENDENCE
Note on a time dependent queue M/D/1 with input equal to service rate
[RAE-TM-MATH-COMP-7807] N79-26832
TIME DIVISION MULTIPLEXING
Analyses of reframing performance of multilevel synchronous time division multiplex hierarchy
N79-26247
TIME LAG
Gravitational time delay in orthogonally polarized radiation passing by the sun
[NASA-CR-158757] N79-27049
TIME SERIES ANALYSIS
Study of modeling and evaluation of remote manipulation tasks with force feedback
[NASA-CR-158721] N79-26785
Least squares prediction for mixed autoregressive moving average time series
[AD-A067768] N79-26850
Spectral estimation using Poisson distributed time series data with time quantization
[AD-A067324] N79-26867
TIME SHARING
Simulation of an information system with a distributed architecture
[FUB-34-1977] N79-26819
TIN
Degradation mechanism of Nb3Sn composite wires under tensile strain at 4.2 K
[BNL-24957] N79-26184
TIP DRIVEN ROTORS
Rotor redesign for a highly loaded 1800 ft/sec tip speed fan. 1: Aerodynamic and mechanical design report
[NASA-CR-159596] N79-26055
TITANIUM ALLOYS
Fracture toughness in titanium alloys
[AD-A067785] N79-26176
Lower cost by substituting steel for titanium
[AD-A067997] N79-26177
TITANIUM COMPOUNDS
SLPX: Superconducting long-pulse tokamak experiment --- magnetics system
[PPPL-1488] N79-26947
TOKAMAK DEVICES
Effects of suprathermal fusion particles in Tokamak plasmas
N79-26939
Doublet demonstration fusion power reactor study
[GA-A-14742] N79-26946
SLPX: Superconducting long-pulse tokamak experiment --- magnetics system
[PPPL-1488] N79-26947
Resistive ballooning mode equation
[ORNL-TM-6629] N79-26954
Alpha heating in toroidal devices
[COO-2218-123] N79-26957
Analytical theory of drift waves and drift Alfven waves in tokamaks
[PPPL-1512] N79-26958
TOPOGRAPHY
Topography of the 0 deg isotherm in the northern Alps in winter time
N79-26680
Relief of the Ocean floor and the new global tectonics
N79-27067
TORNADOES
A contribution to the severe storms intercept project, 1978
[PB-293472/7] N79-26741
TOROIDAL PLASMAS
Effects of suprathermal fusion particles in Tokamak plasmas
N79-26939
Alpha heating in toroidal devices
[COO-2218-123] N79-26957

TOROIDS
Corona performance of toroidal electrodes for high voltage equipment
N79-26309
TORQUE MOTORS
Development of linear and nonlinear magnetic circuit models for the prediction of step motor static performance
N79-26297
TORSION
Warping torsion of reinforced concrete beams with thin-walled open sections
N79-26424
TORSIONAL STRESS
Design charts for torsional properties of non-circular shafts --- stress analysis
[AD-A064109] N79-26401
Elastic-plastic tension-torsion in a circular bar of rate-sensitive material
[OUEL-1265/78] N79-26436
TOWERS
Examination of specific aspects of cooling tower testing methodology
[EPRI-FP-953] N79-26545
TOXIC HAZARDS
Third report of the TSCA Interagency Testing Committee to the administrator, Environmental Protection Agency
[PB-293378/6] N79-26465
TOXICITY AND SAFETY HAZARD
No more cadmium plating? Are there processes to replace it?
[DRIC-TRANS-5462] N79-26195
TRACE ELEMENTS
Trace constituent mixing ratios in the lower stratosphere during the 1977 intertropical convergence zone experiment
N79-26721
Preliminary results from the University of Denver infrared spectrometer - 1977 intertropical convergence zone experiment
N79-26724
Blank corrections for ultratrace atomic absorption analysis
[AD-A056979] N79-26893
TRACKING [POSITION]
Multiple object tracking with non-unique data-to-object association via generalized hypothesis testing -- - tracking several aircraft near each other or ships at sea
N79-26090
TRAFFIC
A simulation investigation of cockpit display of aircraft traffic during curved, descending, decelerating approaches
[NASA-TM-80098] N79-26052
TRAFFIC CONTROL
Highway capacity, measures of effectiveness, and flow theory
[PB-292763/0] N79-27029
TRAJECTORIES
Transfer trajectory design for a shuttle launched geosynchronous payload
N79-26097
TRAJECTORY ANALYSIS
The calculation of optimal aircraft trajectories
[NPL-DNACS-11/78] N79-26051
TRAJECTORY OPTIMIZATION
The calculation of optimal aircraft trajectories
[NPL-DNACS-11/78] N79-26051
TRANSFER FUNCTIONS
Development of a test facility for investigating the relations between noise and inflow disturbance in an aircraft propulsion fan
[TT-7805] N79-26066
Effects of surface states on the low frequency transfer inefficiency in CCD's
N79-26302
Doping process in silicon epitaxy: Transfer function and physicochemical model
N79-26976
TRANSFER ORBITS
Transfer trajectory design for a shuttle launched geosynchronous payload
N79-26097
TRANSFORMERS
Propagation of noise in the far field from electric transformers
N79-26293
Low current linearization of magnetic amplifier for dc transformer
[NASA-CASE-NPO-14617-1] N79-26311
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
TRANSIENT PRESSURES
An evaluation of nozzle response to transient disturbances
N79-26355
TRANSIENT RESPONSE
Transient attenuation of power supplies: A theoretical and practical evaluation of a power supply's ability to prevent coupling of transient from mains network into the DC output
[ECR-83] N79-26334
TRANSISTORS
Improvements in high injection transistor noise theory and models
N79-26299
Theory of charge pumping in MOS transistors
N79-26301
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
TRANSITION METALS
Catalysis by transition metal compounds --- cobalt oxides
N79-26963
Surface studies of group IV-VI layered crystals
N79-26967
Superlattice formation in group 4-B transition metal dichalcogenides
N79-26971
TRANSITION PROBABILITIES
Estimation for uncertain linear systems with jump parameters
N79-26874
TRANSMISSION LINES
Error rate estimation method based on the detection of line coding violations
[FUB-11-1978] N79-26286
TRANSMISSIVITY
Optical transmission characterization of flash evaporated amorphous Se-Ge films
N79-26929
TRANSMISSOMETERS
Feasibility of shipboard laser-attenuation measurements with a portable transmissometer
[AD-A067665] N79-26732
TRANSPORT PROPERTIES
Performance of low thrust attitude control engines. Part 2: Hydrazine engines theoretical performance and transport properties of reaction products
[TUM-LRT-TB-77/6-PT-2] N79-26114
Properties of superconducting Nb3Si
[BNL-24949] N79-26330
Results of a joint USA/USSR hydrodynamic and transport modeling project
[PB-293516/1] N79-26467
TRANSPORTATION
Highway capacity, measures of effectiveness, and flow theory
[PB-292763/0] N79-27029
TRAVELING WAVE TUBES
An investigation of power suck-out in helix traveling-wave tubes
[AD-A067916] N79-26326
TRIANGULATION
A control-volume based finite element method for convective heat and mass transfer
N79-26354
Proximity and reachability in the plane
N79-26838
TRINITROTOLUENE
Laboratory study of pyrolysis of explosive contaminated waste
[AD-A066973] N79-26222
TRITIUM
Laser fusion: Status, future, and tritium control
[UCRL-81946] N79-26950
TRITONS
Realistic interactions and variational calculations of the ground state properties of three body systems on a harmonic oscillator basis
[ISS-P-78/10] N79-26900
Electrodisintegration of few-body systems and realistic interactions
[ISS-P-78/11] N79-26901
TROPICAL METEOROLOGY
Diurnal variability in the GATE [GARP Atlantic Tropical Experiment] region
[PB-292998/2] N79-26751
TROPOPAUSE
U-2 water vapor burden observations through the tropopause
N79-26726
TROPOSPHERE
An investigation of the interaction, evolution and maintenance of the large-scale waves in the stratosphere and troposphere
N79-26584
Tropospheric radiative divergence during phase 3 of the GARP Atlantic Tropical Experiment [GATE]
[PB-292761/4] N79-26609
The mountain mass of Olympus as a heating source of the lower troposphere
N79-26688
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
The intertropical convergence zone experiment: Background and summary
N79-26716
Operational activities
N79-26717
Notes on the meteorology of the intertropical convergence zone during the July 1977 experiment
N79-26718
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment
N79-26719
Trace constituent mixing ratios in the lower stratosphere during the 1977 intertropical convergence zone experiment
N79-26721
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment
N79-26722
Stratospheric aerosols in the intertropical convergence zone, Panama Canal zone
N79-26725
TROPOSPHERIC RADIATION
Diurnal variability in the GATE [GARP Atlantic Tropical Experiment] region
[PB-292998/2] N79-26751
TSUNAMI WAVES
Tsunamis: The propagation of long waves onto a shelf
N79-26753
TUNGSTEN
Materials problems with inertial confinement fusion targets --- gold and tungsten coatings
[LA-UR-79-76] N79-26945
TURBIDITY
Certain characteristics of the atmospheric turbidity
N79-26683
TURBINE BLADES
Structural dynamics, stability and control of high aspect ratio wind turbine generators
N79-26471
Large horizontal axis wind turbine development
[NASA-TM-79174] N79-26504
TURBINE ENGINES
Computer-aided analysis and design of the shape rolling process for producing turbine engine airfoils
[NASA-CR-135367] N79-26175
TURBINES
ORNL PWR-BDHT two-phase flow instrumentation and analysis improvements
[CONF-781146-9] N79-26366
The use of wind data with an operational wind turbine in a research and development environment
[NASA-TM-73832] N79-26502
TURBOCOMPRESSORS
The influence of compressor inlet guide vane/stator relative circumferential positioning on blade wake transport and interaction
[AD-A067969] N79-26060
TURBOFAN ENGINES
Evaluation of a simplified gross thrust calculation technique using two prototype F100 turbofan engines in an altitude facility
[NASA-TP-1482] N79-26057
TURBOGENERATORS
Structural dynamics, stability and control of high aspect ratio wind turbine generators
N79-26471
Elements for technological and economic modeling of tower-type solar power plants
[P/51/76/17] N79-26535
Cost/benefit analysis of a solar power plant supplemented by diesel generation in comparison with a solely diesel system - optimizing for size and initial investment in an isolated area --- energy technology
[P/51/77/21] N79-26536
TURBOJET ENGINES
Alternate subsonic low-cost engine
[AD-A067277] N79-26058
An evaluation of nozzle response to transient disturbances
N79-26355
TURBULENT BOUNDARY LAYER
Three-dimensional boundary layers on bodies of revolution at incidence
N79-26350
An analytical solution of the thick axisymmetric turbulent boundary layer on a long cylinder of constant radius
N79-26352
TURBULENT DIFFUSION
A one-layer model for eddy diffusivity profiles using field data
N79-26664
TURBULENT FLOW
Research programme on turbulent shear layers
[IC-AERO-78-105] N79-26032
Unsteady turbulent thermal convection
N79-26344
Study of second order turbulence models with variable coefficients
N79-26351
Experimental measurements of the behavior of non dilute particle suspensions in turbulent flow
N79-26353
Droplet mixing and deposition in a turbulent flow
N79-26356

Local and average heat transfer characteristics for turbulent air flow in an asymmetrically heated tube N79-26357
Computer program for calculation of separated turbulent flows on axisymmetric afterbodies including exhaust plume effects
[AD-A066925] N79-26363
Turbulent flow past a self-propelled vehicle. 2: Computation
[AD-A067795] N79-26364
The optimal line for turbulent wind oscillations determined from energy spectra N79-26643

TURBULENT MIXING
Droplet mixing and deposition in a turbulent flow N79-26356

TURING MACHINES
A method for the formal description of signaling systems
[FUB-4-1978] N79-26282

TWO DIMENSIONAL BODIES
The solution of two dimensional problems in astrophysics N79-27047

TWO PHASE FLOW
ORNL PWR-BDHT two-phase flow instrumentation and analysis improvements
[CONF-781146-9] N79-26366
Pulsed neutron measurement of single and two-phase liquid flow
[CONF-781113-31] N79-26896

U

U.S.S.R.
Translations on USSR science and technology: Physical sciences and technology, no. 72
[JPRS-73663] N79-27064

ULTRAHIGH FREQUENCIES
Design of VHF and UHF communications air/ground antennas
[AD-A067307] N79-26254
SNR for the EISCAT UHF system
[KWI-78-1] N79-26266

ULTRAHIGH VACUUM
Proceedings of workshops to define engineering requirements for a space vacuum research facility
[NASA-CP-2091] N79-26076
Proceedings of workshops to define engineering requirements for a space vacuum research Facility: Summary N79-26077
NASA workshop on outgassing N79-26078
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Research Association N79-26079

ULTRASONIC RADIATION
Biomedical ultrasonoscope
[NASA-CASE-ARC-10994-2] N79-26771

ULTRASONIC TESTS
The direct phase cepstrum and its applications to ultrasonic testing N79-26414
Ultrasonic studies of radiation damage in an aluminum-manganese alloy N79-26965

ULTRAVIOLET ASTRONOMY
Catalog of far-ultraviolet objective-prism spectrophotometry: Skylab experiment S-019, ultraviolet steller astronomy
[NASA-RP-1031] N79-27057

ULTRAVIOLET LASERS
Research on resonant charge-exchange X-ray and ultraviolet lasers
[AD-A067227] N79-26391

ULTRAVIOLET RADIATION
Fabrication and testing of a sensitive ultraviolet-visible silicon photodiode device N79-26370
Ultraviolet damage resistance of laser coatings
[LA-UR-78-2607] N79-26396

UNDERGROUND STORAGE
Information base for waste repository design. Volume 5: Decommissioning of underground facilities
[PB-293405/7] N79-26904
Risk methodology for geologic disposal of radioactive waste
[NUREG/CR-1458] N79-26906
Storage and disposal of radioactive waste as glass in canisters
[PNL-2764] N79-26911
Information base for waste repository design. Volume 1: Borehole and shaft sealing
[PB-293401/6] N79-26922
Information base for waste repository design. Volume 2: Equipment performance requirements
[PB-293402/4] N79-26923
Information base for waste repository design. Volume 3: Waste/rock interactions
[PB-293403/2] N79-26924
Information base for waste repository design. Volume 4: Mine structural features
[PB-293404/0] N79-26925
Information base for waste repository design. Volume 6: Excavation technology
[PB-293406/5] N79-26926
Information base for waste repository design. Volume 7: Executive summary
[PB-293407/3] N79-26927

UNDERWATER ACOUSTICS
Numerical solutions of underwater acoustic wave propagation problems
[AD-A067023] N79-26887

UNDERWATER COMMUNICATION
Blue-green filter technology
[AD-A067789] N79-26931

UNITED KINGDOM
A consideration of general aviation in the UK
[TT-7902] N79-26010

UNMANNED SPACECRAFT
An encounter with Halley's comet at 24 km per second
[TUM-LRT-TB-78/5] N79-27052

UNSTEADY FLOW
Expansions in series of Chebyshev polynomials of a function occuring in linear unsteady aerodynamic theory
[RAE-TR-77110] N79-26871

UPWELLING WATER
CTD observations off the coast of Peru, R/V Melville, 4 March - 22 May 1977, and R/V Columbus Iselin, 5 April - 19 May 1977
[PB-293377/8] N79-26761

URANIUM ALLOYS
Thermodynamic properties of uranium-mercury system
[IS-T-824] N79-26999

URBAN DEVELOPMENT
Growth effects of major land use projects (wastewater facilities). Volume 2: Summary, predictive equations and worksheets
[PB-293229/1] N79-26572
Development of a drainage with flood control management system for urbanizing communities N79-27022
City-wide Development Corporation development services package
[PB-292972/7] N79-27028
Draft SCAG-78 growth forecast policy
[PB-293245/7] N79-27032
Evaluation of the effects of urbanization on stormwater runoff and quality
[PB-293513/8] N79-27035

URBAN PLANNING
Lands in transition: Lake Champlain shoreland changes, 1960 - 1990
[PB-293431/3] N79-26461
Future directions for public transportation: A basis for decision
[PB-292781/2] N79-27024

URBAN TRANSPORTATION
Future directions for public transportation: A basis for decision
[PB-292781/2] N79-27024

URETHANES
Time-temperature correspondence of the dynamic mechanical properties of halthane 73-18 and halthane 87-1
[BDX-613-1867-REV] N79-26151

USER MANUALS (COMPUTER PROGRAMS)
Feasibility study for a numerical aerodynamic simulation facility. Volume 3: FMP language specification/user manual
[NASA-CR-152289] N79-26070
ARIS manual
[AD-A067830] N79-26139
Turbulent flow past a self-propelled vehicle. 2: Computation
[AD-A067795] N79-26364
CAT information display system users manual
[NASA-CR-161243] N79-26711
NEWSUMT: A FORTRAN program for inequality constrained function minimization, users guide
[NASA-CR-159070] N79-26811
Host-computer implementation guidelines for the three-dimensional Graphics Compatibility System (GCS)
[AD-A067976] N79-26815
A primer for MLAB: An on-line modelling laboratory
[PB-292895/0] N79-26822
A user's guide for TAC PERT
[AD-A068012] N79-27005

USER REQUIREMENTS
The Space Telescope Observatory
[NASA-TM-78301] N79-27043

UTILITIES
Large horizontal axis wind turbine development
[NASA-TM-79174] N79-26504

V

V/STOL AIRCRAFT
Thrust and mass flow characteristics of four 36 inch diameter tip turbine fan thrust vectoring systems in and out of ground effect
[NASA-CR-152239] N79-26056
Investigation of a laser Doppler velocimeter system to measure the flow field around a large scale V/STOL aircraft in ground effect
[NASA-CR-152212] N79-26374

VALIDITY
Validity of the factorized DWIA in e, e1p reactions
[ISS-P-78/8] N79-26899

VALLEYS
Forecast of air pollution in deep valleys N79-26640
SO2 immission concentration during calm in central alpine basins (aichfeld-mur basin styria) N79-26641
Zones of convergence in local air flow in valleys and basins N79-26648
Simultaneous measurements from three motor-gliders of temperature and humidity horizontal distribution in a cross-section of the Inn Valley east of Innsbruck under condition of mountain and valley winds circulation N79-26677
Peculiar humidity-thermal conditions in a carpathian mountain valley in relation to different weather types N79-26679
Energy balance of an Alpine pasture, illustrated by an example for a day of the 1976 dryness period N79-26687

VAPOR DEPOSITION
Deposition of aluminum-copper alloy on laminated polyimide substrates from an RF induction source
[BDX-613-1993-REV] N79-26186

VAPOR PRESSURE
The prediction of geysering in fluid transfer lines by flooding theory N79-26346

VAPORIZERS
Evaluation of selected chemical processes for production of low-cost silicon, phase 3
[NASA-CR-158739] N79-26977

VARIABILITY
Time and space variability of sunshine duration in mesoscale N79-26684

VARIABLE THRUST
Performance and heat transfer of high energy rocket engines with thrust variation
[ILR-21] N79-26111

VEGETATION
Non-urban hydrocarbon concentrations in ambient air north of Houston, Texas
[PB-293227/5] N79-26580

VELOCITY DISTRIBUTION
Development of partial channel flow for arbitrary input velocity distributions using boundary-fitted coorinate systems
[AD-A067623] N79-26365
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 1
[NASA-CR-159575-VOL-1] N79-26884
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 2
[NASA-CR-159575-VOL-2] N79-26885
acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 3
[NASA-CR-159575-VOL-3] N79-26886

VERTICAL AIR CURRENTS
A simple analysis/diagnosis system for real time evaluation of vertical motion
[PB-294216/7] N79-26742

VERTICAL DISTRIBUTION
Day-to-day variations or atmospheric tides as observed by meteor radar
[UILU-ENG-79-2506] N79-26588
The effect of vertical resolution in a limited area atmospheric model N79-26665
Global solar radiation in a vertical profile of the Carpathians N79-26685

VERTICAL LANDING
The characteristics of the spray generated by the efflux of various aircraft propulsors impinging normally on water
[AD-A067742] N79-26049

VERTICAL TAKEOFF AIRCRAFT
Wind-tunnel investigation of highly maneuverable supersonic V/STOL fighter
[NASA-TM-78599] N79-26017
The characteristics of the spray generated by the efflux of various aircraft propulsors impinging normally on water
[AD-A067742] N79-26049

VERY HIGH FREQUENCIES
Design of VHF and UHF communications air/ground antennas
[AD-A067307] N79-26254
VIBRATION ISOLATORS
Vibration isolation measurements on a precision machine tool
[LA-UR-78-3252] N79-26404
VIBRATION MEASUREMENT
Vibration isolation measurements on a precision machine tool
[LA-UR-78-3252] N79-26404
VIBRATION TESTS
Random vibration introduction: Environments, damaging effects, tests, test specifications and test economy
[ECR-84] N79-26435
VIDEO COMMUNICATION
Video telephonic service: Study on the influence of microphone characteristics and band width on intelligibility and quality of audio signals
[FUB-36-1977] N79-26272
VIDICONS
Improved camera-tube performance with pulsed operation
[AD-A067336] N79-26317
The applications of the GISS Vidicon system: Selected topics in astrophysics
N79-27041
VINEYARDS
Remote sensing program
[E79-10211] N79-26440
VISCOELASTICITY
Analysis of rigid pavement on viscoelastic foundation subjected to moving loads
N79-26422
VISCOUS FLOW
A viscous/potential flow interaction analysis for circulation-controlled airfoils
[AD-A067913] N79-26030
Numerical solution of a steady, viscous, axisymmetric cavity-flow problem
[NPL-DNACS-12/79] N79-26368
VISIBILITY
A study of smoke movement in an aircraft fuselage
[RAE-TM-EP-613] N79-26040
The development of mathematical models for the prediction of anthropogenic visibility impairment, volume 1
[PB-293119/4] N79-26613
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 2: Appendices
[PB-293120/2] N79-26614
The development of mathematical models for the prediction of anthropogenic visibility impairment. Volume 3: Case studies for selected scenarios
[PB-293121/0] N79-26615
On the diurnal variation of visibility and fog in Finland
[TR-19] N79-26713
VISUAL FLIGHT
Visual weather conditions for flight over the Alps
N79-26632
The GAFOR system of visual flight forecast for Alpine region
N79-26633
VITRIFICATION
Alternative waste management options, Nuclear Fuel Services, Inc., high level waste --- converting to borosilicate glass
[ANL-K-78-4190-2] N79-26908
Storage and disposal of radioactive waste as glass in canisters
[PNL-2764] N79-26911
VOICE
Subjective speaker recognition: Statistical consideration on attainable results significance
[FUB-17-1978] N79-26287
VOICE COMMUNICATION
Video telephonic service: Study on the influence of microphone characteristics and band width on intelligibility and quality of audio signals
[FUB-36-1977] N79-26272
Automatic speaker recognition: Considerations on an adequate methodology to solve the problem
[FUB-10-1978] N79-26285
VOICE DATA PROCESSING
Description of main methodologies used for speaker recognition
[FUB-1-1978] N79-26274
Automatic speaker recognition: Considerations on an adequate methodology to solve the problem
[FUB-10-1978] N79-26285
VOIDS
Note on non-destructive detection of voids by a high frequency inversion technique
[COO-2482-8] N79-26416
VOLTAGE CONVERTERS [AC TO AC]
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
VOLTAGE CONVERTERS [DC TO DC]
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
VOLTERRA EQUATIONS
On the existence of solutions of nonlinear Volterra equations in abstract spaces
[HTKK-MAT-A120/1978] N79-26855
VORTEX BREAKDOWN
Ground-based measurements of the wake vortex characteristics of a B-747 aircraft in various configurations
[NASA-TM-80474] N79-26016
VORTICES
Ground-based measurements of the wake vortex characteristics of a B-747 aircraft in various configurations
[NASA-TM-80474] N79-26016
Aerodynamic sound generation due to vortex-aerofoil interaction. Part 2: Analysis of the acoustic field
[NASA-CR-152231] N79-26883
VORTICITY
Combustion noise prediction: Entropy/vorticity effects --- in gas turbines
[AD-A067993] N79-26882

W

WAFERS
Analysis and evaluation of processes and equipment in tasks 2 and 4 of the low-cost solar array project
[NASA-CR-158744] N79-26485
Slicing of silicon into sheet material. Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158743] N79-26978
WAKES
The influence of compressor inlet guide vane/stator relative circumferential positioning on blade wake transport and interaction
[AD-A067969] N79-26060
Proceedings of workshops to define engineering requirements for a space vacuum research Facility: Summary
N79-26077
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Res. Association
N79-26080
WARNING SYSTEMS
Report of the FAA task force on aircraft separation assurance. Volume 1: Executive summary
[AD-A067905] N79-26042
The development of a microwave radiometer for use as a highway ice detector
[PB-292645/9] N79-26382
A database interface to WAND for the network alerter service --- ARPA computer network
[AD-A066993] N79-27010
Control programs and data structures for a multiple alerter implementation in a relational data base
[AD-A067168] N79-27013
WARPAGE
Warping torsion of reinforced concrete beams with thin-walled open sections
N79-26424
WASHINGTON
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
The MESA Puget Sound Project, Seattle, Washington
[PB-293906/4] N79-26560
Washington state air monitoring data for 1977
[PB-293085/7] N79-26573
WASTE DISPOSAL
Laboratory study of pyrolysis of explosive contaminated waste
[AD-A066973] N79-26222
Recovery, processing, and utilization of gas from sanitary landfills
[PB-293165/7] N79-26235
Growth effects of major land use projects [wastewater facilities]. Volume 2: Summary, predictive equations and worksheets
[PB-293229/1] N79-26572
Disposal of by-products from nonregenerable flue gas desulfurization systems
[PB-293163/2] N79-26575
Information base for waste repository design. Volume 5: Decommissioning of underground facilities
[PB-293405/7] N79-26904
Risk methodology for geologic disposal of radioactive waste
[NUREG/CR-1458] N79-26906
Scoping study of salt domes, basalts and crystalline rock as related to long term risk modeling for deep geologic disposal of nuclear waste
[UCRL-13945] N79-26907
Alternative waste management options, Nuclear Fuel Services, Inc., high level waste --- converting to borosilicate glass
[ANL-K-78-4190-2] N79-26908
Seabed disposal program, volume 1
[SAND-78-1359] N79-26909
Storage and disposal of radioactive waste as glass in canisters
[PNL-2764] N79-26911
Analytical methodology and facility description spent fuel policy
[DOE/ET-0054] N79-26917
Geotechnical aspects of subsurface seabed disposal of high level radioactive wastes --- core sampling
[COO-4059-1] N79-26918
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919
Information base for waste repository design. Volume 1: Borehole and shaft sealing
[PB-293401/6] N79-26922
Information base for waste repository design. Volume 2: Equipment performance requirements
[PB-293402/4] N79-26923
Information base for waste repository design. Volume 3: Waste/rock interactions
[PB-293403/2] N79-26924
Information base for waste repository design. Volume 4: Mine structural features
[PB-293404/0] N79-26925
Information base for waste repository design. Volume 6: Excavation technology
[PB-293406/5] N79-26926
Information base for waste repository design. Volume 7: Executive summary
[PB-293407/3] N79-26927
WASTE ENERGY UTILIZATION
Use of waste heat from nuclear power plants
[CONF-7811109-4] N79-26527
WASTE UTILIZATION
Recovery, processing, and utilization of gas from sanitary landfills
[PB-293165/7] N79-26235
Fuel contaminants, volume 4: Application of oil agglomeration to coal wastes
[PB-293210/1] N79-26236
WASTE WATER
National Conference on Less Costly Wastewater Treatment Systems for Small Communities
[PB-293254/9] N79-27031
WATER
Wind driven water pumps. Economics, technology, current activities
[PB-292816/6] N79-26542
Effect of water content on the compressibility of snow-water mixtures
[AD-A066936] N79-26589
Interband transitions of semiconducting oxides determined from photoelectrolysis spectra
[AD-A066188] N79-26982
WATER BALANCE
Design of distribution maps of precipitation, evaporation, and runoff in the Alps
N79-26708
WATER FLOW
Improvement of the steady floating random walk Monte Carlo method near straight line and circular boundaries with application to groundwater flow
[PB-292560/0] N79-26453
Present and potential sediment yields in the Yampa River Basin, Colorado and Wyoming
[PB-292677/2] N79-26455
Results of a joint USA/USSR hydrodynamic and transport modeling project
[PB-293516/1] N79-26467
Study of water drainage from columns of snow
[AD-A066935] N79-26590
WATER MANAGEMENT
Institutional arrangements for effective water management in Colorado
[PB-293647/4] N79-26466
Regulatory water quality monitoring. A systems perspective
[PB-292756/4] N79-26552
WATER POLLUTION
Estimates of the annual loading of total phosphorus to Lake Champlain
[PB-293435/4] N79-26459
Lake Champlain basin forestland as a source of nonpoint pollutants
[PB-293434/7] N79-26460
Suitability of input-output models for evaluating the impact of phosphorous loadings to Lake Champlain
[PB-293442/0] N79-26464
Potential marine pollution from the Caviat shipwreck
N79-26549
Regulatory water quality monitoring. A systems perspective
[PB-292756/4] N79-26552
Evaluation of aluminum sulfate for phosphorus control in eutrophic lakes
[PB-292989/1] N79-26556

The MESA Puget Sound Project, Seattle, Washington
[PB-293906/4] N79-26560
Erosion and sedimentation nonpoint pollution sources and controls, LaPlatte River watershed
[PB-293436/2] N79-26576
Distribution of phytoplankton in Arkansas lakes
[PB-292742/4] N79-26768
Evaluation of the effects of urbanization on stormwater runoff and quality
[PB-293513/8] N79-27035

WATER QUALITY
Water resources data for Indiana, water year 1977
[PB-292256/5] N79-26450
Analysis of researchable water problems in the south Atlantic gulf region
[PB-293484/2] N79-26458
A Lake Champlain trophic classification system
[PB-293427/1] N79-26462
Regulatory water quality monitoring. A systems perspective
[PB-292756/4] N79-26552
FEDBAK03: A computer program for the modeling of first order consecutive reactions with feedback under a steady state multidimensional natural aquatic system. Program documentation and user's guide
[PB-292760/6] N79-26553
An evaluation of the effects of geothermal energy development on aquatic biota in the geysers area of California
[PB-293031/1] N79-26562
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578

WATER RESOURCES
HCMM Heat Capacity Mapping Mission
[E79-10214] N79-26441
Analysis of researchable water problems in the south Atlantic gulf region
[PB-293484/2] N79-26458

WATER TABLES
Investigation of water table on the Kesselwandferner [Oetztal Alps] in a 30 m deep firn pit, a synopsis
N79-26690

WATER TREATMENT
The chemistry of disinfectants in water: Reactions and products
[PB-292776/2] N79-26554
National Conference on Less Costly Wastewater Treatment Systems for Small Communities
[PB-293254/9] N79-27031
Pyrogenic activity of carbon-filtered waters
[PB-293172/3] N79-27033
Fate of metal ions during domestic treatment of water containing organics
[PB-293147/5] N79-27034

WATER VAPOR
U-2 water vapor burden observations through the tropopause
N79-26726

WATER WAVES
Gravity wave propagation in the presence of a current with an arbitrary vertical profile
[PB-293806/6] N79-26758

WATERSHEDS
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL] --- Oregon
[E79-10220] N79-26447
Distributed routing rainfall-runoff model
[PB-292303/5] N79-26451
Erosion and sedimentation nonpoint pollution sources and controls, LaPlatte River watershed
[PB-293436/2] N79-26576
Snow on the Po watershed of the Northern Apennines
N79-26702
Evaluation of the effects of urbanization on stormwater runoff and quality
[PB-293513/8] N79-27035

WAVE EQUATIONS
The propagation of surface shear waves. Volume 1: Theory
N79-26277

WAVE EXCITATION
Harmonic generation and parametric excitation in a beam-plasma system
N79-26938

WAVE FUNCTIONS
Electrodisintegration of few-body systems and realistic interactions
[ISS-P-78/11] N79-26901

WAVE INTERACTION
An investigation of the interaction, evolution and maintenance of the large-scale waves in the stratosphere and troposphere
N79-26584

WAVE PROPAGATION
The physics of braided-shield coaxial cable
N79-26251
Boundary integral equation methods applied to wave problems
[AD-A067536] N79-26261
Report on collaboration activity between the 'Istituto Superiore Poste e Telecomunicazioni' and the Ugo Bordoni Foundation in 1977
N79-26275
The propagation of surface shear waves. Volume 1: Theory
N79-26277
The propagation of surface shear waves. Volume 2: Experiments
N79-26278
Tsunamis: The propagation of long waves onto a shelf
N79-26753
Numerical solutions of underwater acoustic wave propagation problems
[AD-A067023] N79-26887

WAVEGUIDES
Quasi-optical elbows in circular waveguide connections
[FUB-39-1977] N79-26273
Fresnel zone lens fabricated by electron beam lithography in thin film waveguide
N79-26305
Source excitation of an open, parallel-plate waveguide. Numerical results
[AD-A067787] N79-26323
Switching in optical channel waveguides
N79-26930
Design method for the layout of quasi optical elbows in a connection with circular wave guides
[FUB-6-1978] N79-26934

WEAK ENERGY INTERACTIONS
Low energy ion-molecule reaction dynamics and chemiionization kinetics
[COO-4694-1] N79-26897

WEAPON SYSTEMS
Research on an automated inertial azimuth measuring system
[AD-A067938] N79-26043
Preliminary studies of microchannel plate photomultiplier tube neutron detectors for flight test applications
[SAND-78-8266] N79-26332

WEAR TESTS
Wear properties of dry bearing liners at ambient and elevated temperatures: A preliminary survey
[RAE-TR-78063] N79-26407

WEATHER
Peculiar humidity-thermal conditions in a carpathian mountain valley in relation to different weather types
N79-26679
Record winter storms in Illinois, 1977 - 1978
[PB-293181/4] N79-26752

WEATHER FORECASTING
Subsidence effects of the Alps
N79-26628
The GAFOR system of visual flight forecast for Alpine region
N79-26633
Objective regional forecast for the Bernese Alps
N79-26635
Forecast of air pollution in deep valleys
N79-26640
The analysis of the influence of the Romanian Carpathians upon wind forecasting in Romania
N79-26673
National Weather Service Act of 1978
[GPO-31-606] N79-26730
The use of 1WW historical terminal forecast performance tables
[AD-A067093] N79-26731
Meteorological studies: Atmospheric analysis, automated weather system development, satellite studies
[AD-A067937] N79-26733
A contribution to the severe storms intercept project, 1978
[PB-293472/7] N79-26741
A simple analysis/diagnosis system for real time evaluation of vertical motion
[PB-294216/7] N79-26742
Diagnostic analyses of the GATE A/B scale area at individual time periods
[PB-292961/0] N79-26743
LFM 24-hour prediction of eastern Pacific cyclones refined by satellite images
[PB-294324/9] N79-26744
National severe local storms operations plan
[PB-294326/4] N79-26745
Manually digitized radar data: Interpretation and application
[PB-293810/8] N79-26747

WEATHER MODIFICATION
A poster: Meteorological experiments in the framework of the 4th large-scale hail suppression test in Switzerland
N79-26707

WEATHER STATIONS
Processing methodology for daily pluviometric data
[MN-MONO-102] N79-26619
Climatology in French Polynesia
[MN-MONO-107] N79-26621

WEATHERING
The effect of weathering on the modulus of rupture of VHR2A and VHR3A glass [Glaverbel-Mecaniver SA]
[DR-MAT-210] N79-26216
The tearing of weathered rubber-coated fabrics
[RAE-TR-78005] N79-26218

WEIGHTING FUNCTIONS
Linear state feedback, quadratic weights, and closed loop eigenstructures
[NASA-CR-158755] N79-26844

WELD STRENGTH
The effect of manganese and nickel additions in the welding flux on the fusion zone of pearlitic ductile iron
N79-26164

WELDED STRUCTURES
Solidification behavior of type 308 stainless steel filler metal
[ORNL-TM-6644] N79-26179

WELDING
An investigation of duplex weld solidification in austenitic stainless steels
N79-26158

WHEAT
Briefing Materials for Plenary Presentations: The LACIE Symposium
[E79-10217] N79-26444

WIND [METEOROLOGY]
Microphone windscreen performance
[PB-292967/7] N79-26289
LLL wind energy studies [OAHU]
[UCRL-82171] N79-26514
Proceedings of the Workshop on Mechanical Storage of Wind Energy
[SAND-79-0001] N79-26528
The optimal line for turbulent wind oscillations determined from energy spectra
N79-26643
Lee side wind profiles during Foehn
N79-26644
Mountain winds in the plains
N79-26645
Solar radiation and valley breeze in the southern parts of the Alps
N79-26647
Local winds in Zagreb
N79-26649
Contribution of orography, thermal wind, and transient eddies to quasistationary waves
N79-26676
South Foehn, north Foehn, and temperature peaks at Innsbruck and Bozen
N79-26678
Feasibility study of satellite-borne lidar global wind monitoring system
[PB-293879/3] N79-26746

WIND MEASUREMENT
Foehn in Haute Tarentaise: A contribution to the study of a French Alpine Foehn
[MN-MONO-108] N79-26622

WIND PRESSURE
Wind excited motion of buildings
N79-26239
Theoretical study of the dynamic response of a chimney to earthquake and wind
[PB-293561/7] N79-26244

WIND PROFILES
The use of wind data with an operational wind turbine in a research and development environment
[NASA-TM-73832] N79-26502
A one-layer model for eddy diffusivity profiles using field data
N79-26664

WIND TUNNEL MODELS
A study of the drooped leading edge airfoil --- on wind tunnel models to reduce spin entry after stall
[NASA-CR-158717] N79-26013
Wind characteristics over ridges
N79-26618
Assessment of an empirical technique for estimating vehicle aerodynamic drag from vehicle shape parameters
[PB-292160/9] N79-27025

WIND TUNNEL TESTS
Pulsed-laser-generated impulse on a surface in supersonic flow
[LOG-J-10741] N79-26012
Wind-tunnel investigation of highly maneuverable supersonic V/STOL fighter
[NASA-TM-78599] N79-26017
Effects of wing leading-edge deflection on low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration --- wind tunnel tests
[NASA-TP-1434] N79-26020
Effect of nose bluntness and afterbody shape on aerodynamic characteristics of a monoplanar missile concept with bodies of circular and elliptical cross sections at a Mach number of 2.50
[NASA-TM-80055] N79-26023
A wind-tunnel investigation of tilt-rotor gust alleviation systems
[NASA-CR-152264] N79-26062
The dynamic modelling of a slotted test section
[NASA-CR-159069] N79-26065

Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067
A simple method of adapting a wind tunnel Schlieren system for interferometry
[AD-A067233] N79-26073
Preliminary wind tunnel simulation study of snow collection gauges
[UTIAS-TN-219] N79-26373
WIND VANES
Comparative investigation of dynamic properties of some propeller vanes
[KNMI-WR-78-1] N79-26738
WIND VELOCITY
Wind characteristics over ridges
N79-26618
Strong winds and weather conditions in Dinaric Alps
N79-26646
The analysis of the influence of the Romanian Carpathians upon wind forecasting in Romania
N79-26673
WINDMILLS [WINDPOWERED MACHINES]
A low-cost water pumping windmill using a sail type Savonius rotor
[PB-294413/0] N79-26541
Wind driven water pumps. Economics, technology, current activities
[PB-292816/6] N79-26542
WINDOWS [INTERVALS]
Holographically improved windows
[AD-A067914] N79-26376
WINDPOWERED GENERATORS
The use of wind data with an operational wind turbine in a research and development environment
[NASA-TM-73832] N79-26502
Large horizontal axis wind turbine development
[NASA-TM-79174] N79-26504
A low-cost water pumping windmill using a sail type Savonius rotor
[PB-294413/0] N79-26541
WINDPOWERED PUMPS
A low-cost water pumping windmill using a sail type Savonius rotor
[PB-294413/0] N79-26541
Wind driven water pumps. Economics, technology, current activities
[PB-292816/6] N79-26542
WINDSHIELDS
Microphone windscreen performance
[PB-292967/7] N79-26289
WING PLANFORMS
Summary of past experience in natural laminar flow and experimental program for resilient leading edge
[NASA-CR-152276] N79-26024
WINTER
Topography of the 0 deg isotherm in the northern Alps in winter time
N79-26680
Record winter storms in Illinois, 1977 - 1978
[PB-293181/4] N79-26752
WORKING FLUIDS
High temperature properties of nuclear reactor coolants and thermodynamic power cycle working Fluids --- in liquid metal fast breeder reactors
[COO-3027-37] N79-27001
WRECKAGE
Potential marine pollution from the Cavtat shipwreck
N79-26549

X

X RAY ANALYSIS
Proportional counter for X-ray analysis of lunar and planetary surfaces --- a position sensitive scintillating imaging proportional counter
[NASA-CR-158754] N79-27051
X RAY DIFFRACTION
Tetracarbon metallocarborances. 6: Stereochemical relationships between Co2C4B6 cage isomers formed by oxidative fusion. Crystal structure of [n5-C5h5]2Co2[CH3]4C4B6H6 isomer 5
[AD-A067836] N79-26989
X RAY FLUORESCENCE
The determination of the alloying constituents of high speed tool steels by X-ray emission spectroscopy
[NPL-CHEM-94] N79-26197
X RAY LASERS
Research on resonant charge-exchange X-ray and ultraviolet lasers
[AD-A067227] N79-26391
X RAY SCATTERING
Scattering studies from polymer blends
N79-26202
X RAY SPECTROSCOPY
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
[LBL-8294] N79-26142
The determination of the alloying constituents of high speed tool steels by X-ray emission spectroscopy
[NPL-CHEM-94] N79-26197

Y

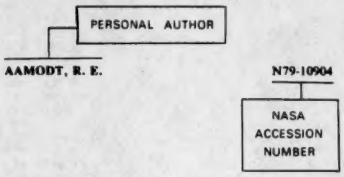
YIELD
Remote sensing program
[E79-10211] N79-26440
Briefing Materials for Plenary Presentations: The LACIE Symposium
[E79-10217] N79-26444
YTTRIUM COMPOUNDS
Energy levels and line intensities for the ground configuration of Pr3+ in LiYF4
[AD-A067845] N79-26140
YUGOSLAVIA
Strong winds and weather conditions in Dinaric Alps
N79-26646
Local winds in Zagreb
N79-26649
The effects of the Alps and the Carpathians on climate of the Pannonian Plain in Yugoslavia
N79-26659
Time and space variability of sunshine duration in mesoscale
N79-26684

Z

ZIRCONIUM
Welding of copper silicon and zirconium II using the 1200 watt CO2 continuous laser
[UNI-1190] N79-26395
ZIRCONIUM ALLOYS
Stabilization of the plutonium delta phase in the plutonium-gallium-zirconium ternary phase equilibria system
N79-26167

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this Index are arranged alphabetically by personal author. The NASA accession number denotes the number by which the citation is identified.

A

AASTROEM, K. N79-27058
ABELE, G. N79-26589
ACCARINO, N. N79-26284
ADAMS, B. B. N79-26328
ADCOCK, J. B. N79-26064
AFTAB, S. N79-26452
AGARWAL, P. N79-26165
AGGARWAL, S. K. N79-26355
N79-26882
AGNIHOTRI, B. B. N79-26891
AHMED, A. H. N. N79-26848
AJAYI, G. O. N79-26267
N79-26599
AKASOFU, S. I. N79-26595
AKGERMAN, N. N79-26175
ALDRICH, B. R. N79-26075
ALEXANDER, D. C. N79-26378
ALFORD, M. R. N79-27031
ALLARD, J. P. N79-26367
ALLEMONG, J. J. N79-26294
ALLEN, B. R. N79-26234
ALLEN, R. E. N79-26140
ALLEY, P. L. N79-26711
ALLEY, W. M. N79-26451
ALTAN, T. N79-26175
ALTMAN, J. G. N79-26791
AMBACH, W. N79-26590
N79-26690
ANCKER, C. J., JR. N79-26869
ANDERSON, J. D., JR. N79-26013
ANDERSON, J. E. N79-26346
ANDERSON, R. J. N79-26037
ANDERSON, W. T. N79-26249
ANDERSON, W. W. N79-26372
ANDREWS, E. D. N79-26455
ANIOL, R. N79-26624
AOKI, S. I. N79-26199
ARAMRATTANA, M. N79-26295
ARENARE, J. A. N79-26059
ARGENTIERO, P. D. N79-26093
ARNOLD, G. N79-26215
ARONSON, S. N79-26180
ASHLEY, P. R. N79-26305
ASSUNCAO, F. C. R. N79-26169
AST, D. G. N79-26432
ATHANS, M. N79-26830
ATWILL, W. D. N79-26043
AUGENSTEIN, B. N79-26454
AVANZINO, S. C. N79-26142
AVERY, S. K. N79-26588
AVRAMI, L. N79-26223
AXELSSON, O. N79-26860
N79-26861

B

BACAL, M. N79-26948
BACCI, C. N79-26902
BADER, T. R. N79-26390
BAECKLIN, L. N79-26740
BAER, W. N79-26095
BAERST, C. F. N79-26058
BAEYENS, P. N79-26195
BAHCALL, J. N. N79-27043
BAHR, D. W. N79-26221
BAILES, K. E. N79-26047
BAILEY, M. M. N79-26478
N79-26483
BAISLEY, R. L. N79-26412
BAKER, C. C. N79-26953
BAKER, G. K. N79-26151
BAKER, K. B. N79-27048
BAKER, R. D. N79-26910
BALIGA, B. R. N79-26354
BALLANTYNE, A. N79-26012
BANDYOPADHYAY, S. S. N79-26422
BANG, B. N79-26435
BANG, K. L. N79-27029
BANKS, J. N79-26540
BARBER, M. R. N79-26016
BARDUCCI, I. N79-26270
N79-26550
BAREFIELD, J. E., II N79-26945
BARKER, D. B. N79-26724
BARLETT, R. N79-26377
BARLOW, J. B. N79-26013
BARNES, G. A. N79-26021
BARRE, J. C. N79-26335
BARSTOW, D. N79-26761
BARTLETT, J. W. N79-26927
BARTOL, F. J. N79-26140
BATEMAN, G. N79-26954
BATLINER, T. A. N79-26259
BAUMGARTNER, A. N79-26708
BAVASSANO, B. N79-27053
BAVUSO, S. J. N79-26810
BAYTOS, W. C. N79-26234
BECKER, R. A. N79-26930
BEHRENS, H. N79-26690
BENDER, G. L. N79-26047
BENEDICT, G. F. N79-27057
BENHAR, O. N79-26921
BENJAMINS, J. N79-26217
N79-26278
BENNETT, A. M. N79-26778
BENNETT, B. I. N79-26153
BENNETT, G. V. N79-26177
BENSON, G. L. N79-26447
BENSON, J. M. N79-27042
BERG, D. N79-26898
BERGER, E. L. N79-26915
BERGER, R. L. N79-26868
BERGMAN, R. O. N79-26068
BERGMANN, H. N79-26690
BERGSTROM, R. W. N79-26613
N79-26614
N79-26615
BERINSKY, S. N79-26382
BERNHARDT, I. N79-26669
BERNSTEIN, M. J. N79-26313
BERRIER, B. L. N79-26022
BERTOLOTTI, M. N79-26936
BHOMBAL, A. H. N79-26204
BIANCASTELLI, R. N79-26920
BIANCHI, F. N79-26270
BIELER, P. L. N79-26557
BLACKBURN, P. N79-26546
BLAKE, N. A. N79-26042
BLAKE, S. N79-26542
BLANC, P. N79-26533
BLAZOWSKI, W. S. N79-26224
BLEISTEIN, N. N79-26416
BLEVINS, D. J. N79-26397
BLINK, J. N79-26524
BLOCH, A. J. N79-27024
BLOCHER, J. M., JR. N79-26977
BLOOMFIELD, H. S. N79-26477
N79-26479
N79-26483
BLOZY, J. T. N79-26884
N79-26885
N79-26886
BLUESTEIN, B. N79-26741
BLUMENTHAL, R. C. N79-27029
BLUMTHALER, M. N79-26590
N79-26690
BOCK, D. H. N79-26037
BODGAN, K. G. N79-26459
BODLE, W. W. N79-26232
BOEHME, A. N79-27052
BOFFI, S. N79-26899
BOGDANOFF, J. L. N79-26243
N79-26244
BOHANNON, K. N79-26568
BOITNOTT, C. O. N79-26721
BONIFAZI, P. N79-26280
BONILLA, C. F. N79-27001
BONSTROM, D. B. N79-26068
BORDONI, F. N79-26339
BOUDOT, R. N79-26188
BOULTON, R. N79-26233
BOUNDS, T. N79-27031
BOUWMEESTER, R. J. B. N79-26618
BOWLES, C. Q. N79-26187
BOWMAN, D. N79-26741
BOYNTON, N. J. N79-26826
BRAASCH, C. H. N79-26512
BRACCO, F. V. N79-26149
BRADEN, R. C. N79-27016
BRADSHAW, P. N79-26032
BRAITINGER, M. N79-26108
BRANDVOLD, G. E. N79-26512
BRANKOVIC, C. N79-26665
BRANTLEY, W. C., JR. N79-26806
BRASHEARS, M. R. N79-26016
N79-26374
BREBSKA-STARKEL, B. N79-26652
BRENNAN, T. J. N79-26834
BRIAN, M. T. N79-26279
BRIGHT, C. W. N79-26772
BRINKMAN, T. W. N79-26068
BROEK, D. N79-26431
BRONNER, G. N79-26947
BROWN, R. S. N79-27035
BROWNING, M. F. N79-26977
BRUGIA, O. N79-26281
N79-26286
N79-26337
N79-26859
BRUMBAUGH, F. R. N79-26442
BRUZZONE, C. N79-26384
BUCHOT, C. N79-26622
BUDDIN, A. L., III N79-26039
BUFALINI, J. J. N79-26571
N79-26579
BUHITE, J. L. N79-26835
BUNEMAN, O. P. N79-26812
N79-27011
N79-27015
BUNYAN, S. N79-26498
BURGESS, A. S. N79-26919
BURKE, S. L. N79-26733
BURLAGA, L. N79-27053
BURMEISTER, L. C. N79-26453
BURNHAM, D. C. N79-26016
BUSH, R. H. N79-26594
BUTLER, K. C. N79-26780
BYRNE, C. A. N79-26201
BYRNE, R. J. N79-26925

C

CADEZ, M. N79-26626
CALAWA, A. R. N79-26985
CALDERONE, T. N79-26932
CALICCHIA, A. N79-26276
N79-26902
CALNAN, D. I. N79-26918
CALOMERIS, P. J. N79-26799
CALVET, J. N. N79-26188
CAMERON, H. M. N79-26480
CAMP, B. J. N79-27033
CAMPANINI, G. N79-26286
CAMPBELL, J. D. N79-26436
CAMPBELL, J. E. N79-26906
CAMPBELL, R. A. N79-26439
CAMPBELL, R. B. N79-26489
CANNON, R. D. N79-27046
CANTU, V. N79-26655
CAPPS, A. G. N79-26510
CARISTI, R. F. N79-26319
CARLSON, K. W. N79-26170

CARMICHAEL, B. H. N79-26024
CARMICHAEL, D. N79-26741
CARMICHAEL, D. C. N79-26486
CARPENTER, M. N79-27020
CARRIGAN, B. N79-27059
N79-27060
CARRIKER, W. N79-26780
CASON, C. N79-26394
CASSADY, P. N79-26384
CASSELL, R. B. N79-26264
CAVES, R. E. N79-26010
CEHAK, K. N79-26706
CHAN, J. N79-26377
CHANDLEE, C. N79-26898
CHANG, S. H. N79-27041
CHANGNON, D. N79-26752
CHANGNON, S. A., JR. N79-26752
CHAO, W. C. W. N79-26583
CHEN, C. N79-26376
CHEN, C. C. N79-26243
CHEN, L. N79-26958
CHEN, M. M. N79-26168
CHEN, W. C. N79-26429
CHESNUTT, J. C. N79-26176
CHITTINENI, C. B. N79-26446
CHIU, S. H. J. N79-26068
CHOI, D. H. N79-26350
CHOW, J. G. Y. N79-26180
CHRISTENSEN, D. O. N79-26816
CHRISTIAN, C. A. N79-27040
CHRISTIANSEN, W. N79-26384
CHU, K. R. N79-26389
CHU, Y. Y. N79-26827
CHUNG, M. K. N79-26351
CHURNSIDE, J. H. N79-26933
CIHANGEIR, S. N79-26898
CIHLAR, J. N79-26469
N79-26470
CIOFIDEGLIATTI, C. N79-26901
N79-26921
CLARK, B. R. N79-26231
CLARK, D. N79-26174
CLARK, G. W. N79-26182
CLARKE, J. R. N79-26947
CLARY, J. B. N79-26795
CLEMENT, R. N79-26693
CLEVENSON, S. A. N79-26782
CLIFF, S. B. N79-26366
COCHRANE, J. A. N79-26035
COE, P. L., JR. N79-26020
COENEN, J. W. E. N79-26194
COFFEY, H. E. N79-27054
N79-27055
COHEN, J. K. N79-26416
COLBECK, S. C. N79-26590
COLEMAN, L. W. N79-26949
COLEY, G. N79-27002
CONN, R. W. N79-26511
CONSTANTINIDES, N. J. N79-26253
COOKE, G. D. N79-26556
COPES, W. S. N79-26866
CORNEY, N. S. N79-26216
COSA, M. N79-26550
COSANDEY, F. N79-26166
COSBY, P. C. N79-26592
COSTAS, J. P. N79-26322
COSTLE, D. M. N79-27031
COTSIDAS, T. P. N79-26250
COTTON, R. H. N79-26050
COTTRELL, R. L. A. N79-27019
COURTER, R. W. N79-26029
COURVOISIER, H. W. N79-26635
COWDERY, S. J. N79-26992
COX, L. A., JR. N79-26789
COX, M. G. N79-26862
COX, S. K. N79-26609
COY, D. W. N79-26551
COYLE, P. E. N79-26950
CRAGIN, J. C. N79-26893
CRAIG, R. A. N79-26720
CRANE, J. K., III N79-26383
CRAWFORD, F. W. N79-26942
CRESS, D. H. N79-26591
CRONN, D. R. N79-26722
CRONVICH, L. L. N79-26021
CROSBY, E. C. N79-27035
CROSS, E. F. N79-26317
CROWELL, W. H. N79-27024
CULPAN, E. A. N79-26196
CUMMINGS, D. A. N79-26333
CUNNINGHAM, D. N79-27021
CUR, O. N. N79-26358
CURIC, M. N79-26672
CURRIE, J. R. N79-26439
CURTIS, P. E. M. N79-26051

D

DADONE, A. N79-26406
N79-26549
DAGOSTINO, R. B. N79-26572
DAIBER, F. C. N79-26760
DAINO, B. N79-26935
DALGARNO, A. N79-26593
DAMIEN, A.
DANDRIA, M.
DANIEL, B. E.
DANIELSON, E. F.
DARBY, J. B., JR.
DAS, S. K.
DAUGHERTY, D. P.
DAVID, S. A.
DAVIES, D. E.
DAVILAMARQUEZ, A. M.
DAVIS, D. N.
DAVIS, H. T.
DAVIS, J. R.
DAWDY, D. R.
DEARTH, K. H.
DEATON, E. T., JR.
DEBBAN, B. L.
DECINA, M.
DEDECKERE, E. A. M.
DEFAZIO, R. L.
DEFEUTER, J. A.
DEFOREST, S. E.
DEMARRAIS, G. A.
DEMATOS, M.
DENLI, N.
DENOTH, A.
DENTON, M. B.
DERBLOM, H.
DESETA, D.
DEUTCH, J. M.
DEVER, J.
DEVITO, M. F.
DEW-HUGHES, D.
DEWAR, M. J. S.
DEWART, J. M.
DEYOUNG, R. J.
DHAMRAIT, J. S.
DHAUTESERRE, A.
DIEULIIS, V. A.
DILLON, R. T.
DINITTO, J. R.
DISCENZA, W.
DITTBERNER, W.
DOBROTT, R.
DOBROWOLNY, M.
DOERING, B.
DOLAN, K. W.
DOLL, J.
DON, T. C.
DONATH, F. A.
DONAVAN, P. R.
DOWDY, M. W.
DRAAYER, J. P.
DRAGHICI, I.
DREEMAN, E. L.
DREISEITL, E.
DRUZGALSKI, C. K.
DUCLAY, J. E.
DUFFEY-ARMSTRONG, M.
DUGAN, J. T.
DUNN, J. H.
DUNNINGTON, F.
DUROCOCQ, C.
DUVALDCHRISTENSEN, J.
DVORAK, F. A.
DWIGHT, K.

E

EAKINS, G.
EARL, T. D.
ECHERT, W. H.
EDMISTER, R. O.
EDWARDS, B.
EGGER, D.
EHLE, P. E.
EISNER, H.
EL-CONSUL, A. M.
ELAM, J. J.
ELLINGTON, J. A.
ELLIOTT, G.
ELLIS, J.
ELSTON, L. W.
ELTOUKHY, A. H.
ELWOOD, J. H.
ENG, G.
ENGE, P. K.
ENGLES, D.
EPLER, J. L.
ERICKSON, L.
ERZBERGER, H.
ESCHER-VETTER, H.
ESCOURROU, G.
ESKER, D. W.
ESPAIGNOL, J. N79-26190
ESTEROWITZ, L. N79-26335
ESTES, E. D. N79-26532
EYRING, E. M. N79-26739
N79-26555
N79-26718
N79-26953
N79-26178
N79-26551
N79-26179
N79-26871
N79-26164
N79-26836
N79-26906
N79-26489
N79-26451
N79-27031
N79-26439
N79-26395
N79-26284
N79-26766
N79-26767
N79-26097
N79-26217
N79-26277
N79-26278
N79-26597
N79-26559
N79-26611
N79-26127
N79-26352
N79-26590
N79-26794
N79-26660
N79-26337
N79-26859
N79-26952
N79-26780
N79-26328
N79-26330
N79-26892
N79-26751
N79-26385
N79-26242
N79-26621
N79-26248
N79-26906
N79-26318
N79-26084
N79-26081
N79-26108
N79-27052
N79-26341
N79-27053
N79-26787
N79-26332
N79-27052
N79-26048
N79-26906
N79-26289
N79-26412
N79-26895
N79-26666
N79-26800
N79-26645
N79-26769
N79-26703
N79-26510
N79-26582
N79-26482
N79-26463
N79-26189
N79-26334
N79-26030
N79-26982

F

FABIAN, W. N79-26967
FAGHIHI-SHIRAZ, A. N79-26347
FAIR, D. H. N79-26570
FALARSKI, M. N79-26017
FALCIASECCA, G. N79-26273
N79-26934
FANG, B. T. N79-26096
FANG, T. F. N79-26296
FARASSAT, F. N79-26881
FARLOW, N. H. N79-26725
FARNUM, E. H. N79-26945
FARRAR, F. N79-26254
FARRAR, J. M. N79-26897
FARRAR, R. A. N79-26174
FEA, G. N79-26670
FEARN, D. G. N79-26109
FEDERER, B. N79-26707
FEIGELSON, R. S. N79-26991
FELTNER, W. R. N79-26475
FENSKE, G. N79-26178
FERBEL, T. N79-26898
N79-26912
FERNANDEZ, J. A. N79-26829
FERREIRA, R. T. D. N79-26344
FERRELL, E. F. N79-26200
FERRISS, D. H. N79-26368
FERRY, G. V. N79-26725
FIELDS, S. R. N79-26409
FILE, J. N79-26947
FILLIPPONI, P. N79-26858
FIRESTONE, R. F. N79-26209
FISCHER, G. N79-26669
FISCHER, W. A. N79-26173
FLEMING, E. S. N79-26143
FLEMING, J. R. N79-26978
N79-26979
FLING, R. B. N79-26575
FLOCCHINI, G. N79-26694
N79-26701
FLOHR, M. D. N79-26591
FLORENCE, J. M. N79-26928
FLORICA, M. N79-26673
FLYNN, T. S. N79-26562
FOEHN, P. M. B. N79-26699
FOLKERTS, C. H. N79-26297
FOLSOM, D. N79-26236
FONTANA, J. N79-26215
FORD, C. S. N79-26144
FORS, J. N79-26742
FOSS, P. O. N79-26466
FOURNIER, R. H. N79-26023
FOWLER, C. F. N79-26763
FOWLER, L. A. N79-27039
FOWLER, R. B. N79-26061
FRANCESCHINI, F. N79-26936
FRANK, W. M. N79-26743
FRANKEL, R. E. N79-26812
FRANKENBER, C. E., JR. N79-26047
FRAZER, J. E. N79-26570
FREEMAN, A. J. N79-26983
FREEMAN, C. E. N79-26015
FREEMAN, R. E. N79-26510
FRENCH, J. B. N79-26895
FRENCH, R. S. N79-26888
FREUND, H. P. N79-26944
FRIEDLANDER, M. N79-26180
FRIES, R. J. N79-26945
FRIESEN, D. K. N79-26805
FRIPPEL, G. N79-26084
FRITCHMAN, B. D. N79-27014
FROES, F. H. N79-26176
FROIDEVAUX, M. R. N79-26879
FRULANI, S. N79-26899
FRYER, T. B. N79-26762
FRYXELL, B. A. N79-27047
FUCHS, A. J. N79-26082
FUKUSHIMA, Y. N79-26898
FULLER, L. F. N79-26298
FULLIN, W. C. N79-26880
FUNAKOSHI, T. N79-26199
FURETTA, C. N79-26902

G

GAFFNEY, P. W. N79-26955
GAINDHAR, J. L. N79-26163
GAINES, G. B. N79-26486
GALE, R. J. N79-26138
GALEN, B. N79-26215
GALLAGHER, J. J. N79-26101
GALVAN, L. N79-26500
GAMBLE, J. L. N79-27031
GAMMAGE, R. B. N79-26148
GANATOS, P. N79-26345
GANDINO, C. N79-26647
GANGULY, A. K. N79-26389
GANZMAN, E. C. N79-26760

GARCIA, A. N79-26498
GARDNER, C. L. N79-26299
GARNIER, M. N79-26620
GARRETT, H. B. N79-26597
GARTENKRAUT, M. N79-26824
GASSER, O. N79-26632
GATHERS, G. R. N79-27000
GAVRILOV, M. A. N79-27065
GAWTHROP, P. J. N79-26833
GAY, B. W., JR. N79-26571
GBURCIK, P. N79-26671
GEHLEN, P. C. N79-26198
GELO, B. N79-26668
GENTILE, F. P. N79-26889
GERBER, H. N79-26732
GERSTEIN, B. C. N79-26329
GERVAIS, R. L. N79-26513
GHANEM, H. M. F. N79-26423
GHEORGHITA, P. N79-26673
GIACOMELLI, L. N79-26283
GIBSON, B. C. N79-26968
GIFFORD, L. N. N79-26430
GILBERT, B. N79-26138
GILBERT, W. E. N79-26761
GILCHRIST, B. E. N79-26587
GILL, D. H. N79-26396
GILL, P. E. N79-26820
GILSINN, D. N79-26994
GIORDANA, A. N79-26920
GIUFFRE, M. S. N79-26904
N79-26925
GIULIANO, C. R. N79-26386
GIUSTI, E. N79-26899
GLASNOVIC, D. N79-26674
GLEASON, C. C. N79-26221
GOIN, K. L. N79-26146
GOLBECK, J. N79-26763
GOLDEN, D. E. N79-26748
GOLDMAN, A. N79-26724
GOLDMAN, H. N79-26485
GOLDMAN, J. C. N79-26230
GOODWIN, G. M. N79-26179
GOOREVICH, C. N79-26092
GORING, D. G. N79-26753
GORSTKO, A. B. N79-26467
GOSS, L. P. N79-26123
GRABOWSKI, W. J. N79-26364
GRANAT, L. N79-26740
GRANATSTEIN, V. L. N79-26387
GRAS, J. M. N79-26189
N79-26191
N79-26192
N79-26533
GRAVEN, W. M. N79-26575
GRAVES, E. B. N79-26023
GRAYSON, W. L. N79-26107
GREEN, D. S. N79-27036
N79-27037
N79-27038
GREEN, D. W. N79-26453
GREEN, F. M. N79-26069
GREEN, S. S. N79-26068
GREENWALD, M. N79-26959
GREER, M. O. N79-26390
GRIEST, W. H. N79-26147
N79-26231
GRIFFITH, K. T. N79-26609
GRIFFITHS, J. M. N79-26197
GRIMES, R. N. N79-26141
N79-26989
GRIPENBERG, G. N79-26855
GRISWOLD, M. N79-26018
GRONAGER, J. E. N79-26353
GROOM, N. J. N79-26372
GROSS, J. M. N79-26616
GROTH, R. H. N79-26563
GROUMPOS, P. P. N79-26872
GRUEN, D. M. N79-26529
GUERIN, M. R. N79-26231
GULDBERG, P. H. N79-26572
GUMAS, G. N79-26065
GUSTAFSSON, I. N79-26860

H

HAAS, E. A. N79-27004
HAASZ, A. A. N79-26373
HABERCOM, G. E., JR. N79-26033
HAECHLER, P. N79-26707
HAECKEL, H. N79-26687
HAHN, G. T. N79-26198
HAHN, S. N79-26171
HAIN, K. N79-26139
HAKHU, J. K. N79-26929
HALDEMAN, C. W. N79-26594
HALE, G. J. N79-26186
HALL, C. N79-26368
HALL, D. L. N79-26086
HALL, R. M. N79-26064
HALLER, J. A. N79-26483
HALLET, R. W., JR. N79-26513
HALLGREN, R. E. N79-26745
HALLICK, T. M. N79-26135
HALLOCK, J. N. N79-26016
HAM, N. D. N79-26062
HAM, R. K. N79-26235
HAMBERG, G. N79-26267
HAMILTON, G. W. N79-26948
HAMILTON, N. I. N79-26523
HANKIN, N. N. N79-26779
HANSCHE, B. A. N79-26804
HANSEN, K. C. N79-26487
HANSEN, S. D. N79-26068
HANSON, F. E. N79-26122
HANSSON, A. N79-27029
HARADA, Y. N79-26209
HARBISON, M. W. P. N79-26124
HARENG, M. N79-26993
HARKNESS, S. D. N79-26953
HARRANG, J. N79-26960
HARTMANNSGRUBER, R. N79-26642
HARWIT, M. N79-27044
N79-27049
HASELGROVE, M. K. N79-26359
HASSELL, J. A. N79-26486
HATCH, J. L. N79-26584
HATHAWAY, S. A. N79-26225
HAWARDEN, T. G. N79-27046
HAWK, J. D. N79-26019
HAWKINS, S. J. N79-27033
HAX, A. C. N79-27004
HAYES, C. F. N79-26986
HAYES, D. M. N79-26725
HAYES, S. R. N79-26613
N79-26614
HAYN, D. N79-26615
N79-26108
N79-26113
N79-26114
N79-26115
N79-26116
N79-26117
N79-26118
HAYNES, F. D. N79-26589
HAYWARD, J. N79-27011
HAYWARD, J. W. N79-27012
HDEIB, H. Z. N79-26878
HEARN, R. H. N79-26325
HEDBERG, A. N79-26267
HEFLICK, S. N79-26742
HEIDNER, R., III N79-26500
HEINO, R. N79-26713
HEKIMIAN, K. K. N79-26235
HELGASON, R. V. N79-26849
HELLER, J. A. N79-26479
HELLWARTH, R. W. N79-26386
HELLWIG, J. W. N79-26780
HELSDON, J. H., JR. N79-26617
HELTON, J. C. N79-26906
HENDERSON, D. M. N79-26931
HENIZE, K. G. N79-27057
HEPPNER, D. B. N79-26135
HERBST, M. J. N79-26937
HERMANN, A. N79-26695
HERN, S. C. N79-26768
HESS, M. N79-26652
N79-26685
HESTER, L. R. N79-26365
HICKS, R. G. N79-26903
HIGGINBOTHAM, M. N79-27002
HILGERT, J. W. N79-26768
HILL, B. N79-26220
HILL, J. W. N79-26785
HILLYER, M. J. N79-26613
N79-26614
N79-26615
HILSEN, N. B. N79-26101
N79-26102
N79-26326
HINSON, D. P. N79-26948
HISKES, J. R. N79-26231
HO, C. N79-26300
HO, C. P. H. N79-26198
HOAGLAND, R. G. N79-26324
HOBROCK, L. W. N79-26684
HOCEVAR, A. N79-26380
HOCKINGS, K. J. N79-27000
HODGSON, W. M. N79-26331
HOFFER, J. K. N79-26780
HOFFMAN, J. C. N79-26076
HOFFMAN, R. W. N79-26385
HOHL, F. N79-26060
HOLBROOK, G. J. N79-27001
HOLDER, G. P. N79-26182
HOLDER, J. D. N79-26408
HOLDSWORTH, P. N79-26101
HOLLAND, L. D. N79-26102
N79-26475
HOLLIS, B. R. N79-26598
HOLMES, J. C. N79-26716
HOLTON, J. R. N79-26382
HONG, H. K. N79-26103
HONMA, M. N79-26183
HOOVER, W. R. N79-26546
HOPENFELD, J. N79-26568
HOPKINS, F. C. N79-26103
HORIKAWA, Y. N79-26776
HORNSTRA, G. N79-26289
HOSIER, R. N. N79-26524
HOVINGH, J. N79-26852
HSU, K. HUBA, J. D. N79-26596
HUBBARD, R. W. N79-26288
HUDSON, J. F. N79-27031
HUFFACKER, R. M. N79-26746
HUGHES, R. C. N79-26797
HUMPHREYS, J. B. N79-26379
HUMSTONE, E. N79-26461
HUNG, J. C. N79-26375
HUTTER, J. A. N79-27029
HUYER, A. N79-26761
HWANG, C. S. N79-26424
HYER, M. W. N79-26402
HYLAND, R. E. N79-26483

I

IBBA, G. N79-26272
N79-26274
N79-26285
N79-26287
N79-26550
IGOE, W. B. N79-26064
ILES, P. A. N79-26488
N79-26495
ILIC, D. N79-26877
ILIESCU, M. N79-26705
ILIN, A. V. N79-27067
INDRAYAN, A. N79-26845
INN, E. C. Y. N79-26721
INOMATA, K. N79-26199
IRANI, A. A. N79-26913
IRVING, A. C. N79-26915
IRWIN, R. B. N79-26996
ISAKOWER, P. I. N79-26401
IVANOVIC, M. N79-26343

J

JACKSON, C. W. N79-26378
JACKSON, H. J. N79-26223
JACKSON, K. N79-26825
JACKSON, R. D. N79-26441
JACKSON, T. A. N79-26224
JAI, A. N79-26795
JAIN, M. N79-26741
JAIN, R. K. N79-26386
JAN, L. N79-26683
JANES, D. E. N79-26779
JANZEN, J. N79-26377
JASSBY, D. L. N79-26947
JAULENT, M. N79-26854
JAVITZ, H. S. N79-27036
N79-27037
N79-27038
JAYARAJAN, A. N79-26162
JENDRIZKY, G. N79-26651
JENSEN, A. P. N79-26800
JENSEN, T. N79-26898
JINO, M. N79-26788
JISCHKE, M. C. N79-26027
JOHNSON, B. N79-26597
JOHNSON, C. B. N79-26064
JOHNSON, D. L. N79-26965
JOHNSON, H. G. N79-26947
JOHNSON, J. R. N79-26516
JOHNSON, T. R. N79-26519
JOHNSON, W. C. N79-26984
JOHNSON, W. L. N79-26181
JONES, A. B. N79-26231
JONES, H. N79-26254
JONES, K. W. N79-26916
JONES, R. W. N79-26394
JORDAN, A. J. N79-26374
JORGENSEN, J. H. N79-27033
JOUATTE, D. N79-26192
JUNKINS, J. L. N79-26088
JURCEC, V. N79-26675

K

KAEPPELER, H. J. N79-26961
KAIHO, K. N79-26184
KAISER, H. W. N79-26327
KAISER, J. A., JR. N79-26252
KAJOSAARI, S. N79-26712
KAM, K. S. N79-26964
KAMAT, M. N79-26875
KAMINSKY, M. N79-26178
KAMMERER, J. G. N79-26796
KANNINEN, M. F. N79-26198
KANTOR, J. E. N79-26783
KARAMCHETI, K. N79-26883
KAREEM, A. N79-26239
KATTEN, S. L. N79-26235
KAU, S. P. N79-26089
KAUFMAN, H. R. N79-26110
KAW, R. K. N79-26301
KEHLER, P. N79-26896
KELLER, G. R. N79-26176
KELLER, H. M. N79-26696
KELLER, U. N79-26628
KELLY, D. L. N79-26101

KENNEDY, A. R.

KENNER, B. G.
KENNINGTON, J. K.
KENT, J. S.
KERN, E. C., JR.
KERR, J. R.
KERST, R. A.
KERWAWYCZ, J. P.
KESSELRING, J. P.
KESSINGER, C.
KESSLER, S. W.
KEUL, A. G.
KEY, K. F.
KHALIL, H. K. E. D.
KHATTAK, C. P.
KIANG, J. K. Y.
KIKUCHI, A.
KILGORE, R. A.
KING, M. K.
KING, R. B.
KIRCHLECHNER, P.

KISSEL, R. R.
KLASCHKA, T. F.
KLEID, N. A.
KLEIN, D. L.

KLEIN, M. W.
KLETT, M. G.
KLOEZE, J.
KLOOS, G.

KNIGHT, J. A.
KNOTT, P. R.

KNOWLES, G. R.
KNOX, J. B.
KOBURGER, C. W., III
KOCH, R.
KODITSCHEK, D. E.
KOEHLER, D. E.
KOENEKE, C. J.
KOFFYBERG, F. P.
KOK, B.
KOKOROWSKI, S. A.
KOLBE, W. F.
KOLNIKOFF, E. B.
KOMINE, H.
KONING, J. W., JR.
KOPLIK, C. M.

KOPSTEIN, S. H.
KORFMACHER, W. A.
KRAFT, R.
KREBS, P.

KRENITSKY, D. J.
KRICHEVSKY, V.
KROHM, G. C.
KROHN, H. E.
KROWN, W. L.
KUHN, G. D.
KUHN, M.
KUHN, P. M.
KUHN, W.
KUKACKA, L. E.
KULCINSKI, G. L.
KULKARNI, S. V.
KURTENBACH, F. J.
KURZ, M.
KUZMIN, B. A.
KWAY, W. L.

L

LABRUM, G. R.
LACAVA, M.

LACEY, D. W.
LACIVITA, C. D.
LACOUDRE, N.

LAHOTI, G. D.
LAKSHMIVARAHAN, S.
LAM, S. H.
LAMBDIN, D. L.

LAMBERTI, G. A.
LAMBOU, V. W.
LAMICH, G.
LANGBERG, N. A.
LANHAM, J. W.

LAPP, T. W.
LARRABEE, G.
LASCH, K. B.
LATIMER, D. A.

N79-26102
N79-26245
N79-26246 LAUF, R. J.
N79-26070 LAUSCHER, F.
N79-26849 LAVALLE, L.
N79-26039 LAWLESS, R. A.
N79-26525 LAY, L. A.
N79-26933 LEATHERWOOD, J. D.
N79-26938 LEBERRE, S.
N79-26207 LECAVIL, B.
N79-26548 LECOZ, J. J.
N79-26741 LEE, D.
N79-26328 LEE, D. T.
N79-26634 LEE, H. M.
N79-26781 LEE, J. I.
N79-26873 LEE, L. C.
N79-26981 LEE, M. H.
N79-26205 LEE, R.
N79-26172 LEE, R. D.
N79-26064 LEE, R. S.
N79-26227 LEE, T. H.
N79-26407 LEE, T. S.
N79-26590 LEE, W. B.
N79-26690 LEE, Y. C.
N79-26439 LEE, Y. T.
N79-26106 LEFLER, J. G.
N79-26803 LEFLER, R. M.
N79-26068 LEISEY, S. A.
N79-26963 LEM, H. Y.
N79-27031 LEMBERGER, T. R.
N79-26577 LEMONT, H. E.
N79-26765 LENGEL, J. E.
N79-26719 LEO, P. P.
N79-26729 LEON, J. J. P.
N79-26222 LEON, R. V.
N79-26884 LEONARD, J. A.
N79-26885 LESKOVAR, B.
N79-26886 LEVINE, J. S.
N79-26357 LEVINS, P. L.
N79-26514 LEWELLAN, W. S.
N79-26161 LEWIS, J. W.
N79-26275 LI, K. Y.
N79-26851 LI, S. T.
N79-26411 LIANG, T.
N79-26302 LIANG, Y. F.
N79-26982 LICARI, J. J.
N79-26763 LIGHT, G. C.
N79-26932 LIN, J. S.
N79-26544 LIN, Y. H.
N79-26454 LIN, Y. J.
N79-26388 LINCOLN, N. R.
N79-27017
N79-26904
N79-26922 LIND, R. C.
N79-26923
N79-26924 LIPPOLD, J. C.
N79-26925 LISAC, I.
N79-26926 LITTMAN, F. E.
N79-26448 LIU, C. H.
N79-26119 LIU, M. K.
N79-26994
N79-26269
N79-26334 LIU, S. C.
N79-26432 LIU, S. S. S.
N79-26323 LIU, W. S.
N79-26520 LLOYD, D. E.
N79-26068 LO, H.
N79-26328
N79-26363 LOBKOWICZ, F.
N79-26678 LOCKHART, L. B., JR.
N79-26726 LOCKMAN, W. J.
N79-26667 LOEWENSTEIN, M.
N79-26215 LOFY, R. J.
N79-26511 LOGAN, J. C.
N79-26121 LOGG, C. A.
N79-26057 LOGSDON, J. D.
N79-26629
N79-27066
N79-26991 LONCAR, E.
LONG, S. J.
LONNEMAN, W. A.
LOSEKE, W. A.
LOTSPEICH, J. F.
N79-26378 LOWE, D. S.
N79-26340 LUCAS, E. L.
N79-26821 LUDTKA, G. M.
N79-26025 LUHMAN, T.
N79-26340 LUND, G. F.
N79-26191
N79-26192
N79-26175
N79-26843

M

N79-26521 MACHALEK, A.
N79-26779 MACK, E. J.
N79-26779 MAEDA, S.
N79-26562 MAGGI, W.
N79-26768
N79-26529 MAGRUDER, S. F.
N79-26848 MAHERAS, P.
N79-26132 MAHMOOD, K.
N79-26133 MAIYA, P. S.
N79-26568 MALCHOW, G. L.
N79-26341 MANGIALARDI, L.
N79-26318 MANISCALCO, J.
N79-26613 MANNING, P. E.
N79-26614 MANTEAU, G.
N79-26615
N79-26160 MANTIPLY, E. D.
N79-26658 MARCUS, S. I.
N79-26676
N79-26555 MARCYK, G. T.
N79-26219 MARDESICH, N.
N79-26782 MARGOZZI, A. P.
N79-26993 MARIANI, F.
N79-26619 MARKOS, V. H.
N79-26152 MARKSON, R.
N79-26887 MARKWORTH, A. J.
N79-26838 MARQUINA, N. E.
N79-26028 MARSCHALL, C. W.
N79-26131 MARSHALL, M. F.
N79-26592 MARSTON, T. U.
N79-26933 MARTIN, D. R.
N79-26377 MARTIN, D. W.
N79-26771 MARTIN, G. D.
N79-26031 MARTIN, J. N.
N79-26382 MARTIN, S.
N79-26999 MARTIN, W. G.
N79-27025 MARTINEZ MONTES, J. D.
N79-26958 MARTINEZ, R.
N79-26894 MARZOLF, G. R.
N79-26093 MASYCZEK, D.
N79-26090 MATSUMOTO, J. H.
N79-26783 MATTHIESEN, R. B.
N79-26725 MATVEYEV, A. A.
N79-26962 MAWHIN, J.
N79-26046 MAXWELL, W. M.
N79-27017 MAYER, H.
N79-26575 MAYNARD, C. W.
N79-26854 MCCANN, J.
N79-26848 MCCOY, D. D.
N79-26530 MCDONALD, C. F.
N79-26544 MCDONALD, M. B.
N79-26942 MCDOWELL, C. M.
N79-26154 MCEACHRON, N. B.
N79-26566
N79-26846
N79-26487 MCELRAVY, E.
N79-26263 MCFARLANE, T.
N79-26440 MCGARRY, E. D.
N79-26210 MCGINLEY, J.
N79-26212 MCGINNISS, V. D.
N79-26134 MCGRATH, P. E.
N79-26225 MCINERNEY, R. E.
N79-26831 MCINTYRE, C. M.
N79-26349 MCKNIGHT, W. B.
N79-26067 MCLEAN, J. D.
N79-26068 MCLYMAN, W. T.
N79-26070 MCNAIR, A. J.
N79-26386 MCSHANE, W. R.
N79-26932 MECH, S. J.
N79-26158 MEGUID, S. A.
N79-26643 MEIER, W.
N79-26574 MELZER, J.
N79-26870 MENDEL, J. E.
N79-26613 MENDELSOHN, M.
N79-26614 MERIDITH, P.
N79-26615 MERKLE, J. G.
N79-26802 MERLO, U.
N79-26247 MERRITT, R. G.
N79-26360 MERZ, F.
N79-26832 MESSERLI, B.
N79-26243 METHVEN, T. J.
N79-26244 MEZEY, E. J.
N79-26898
N79-26213 MICALE, F. J.
N79-26235 MICHNA, E.
N79-26720 MILBERGS, E.
N79-26235
N79-26262
N79-27019 MILEY, G. H.
N79-27036 MILLER, R. N.
N79-27037 MILOSAVLJEVIC, K.
N79-27038
N79-26646 MIN, S.
N79-26570
N79-26579 MINAHAN, J. A.
N79-26570 MINEAR, R. A.
N79-26931 MINECK, R. E.
N79-26456 MINTON, S. M.
N79-26711 MIRABILE, C.
N79-26159 MIRANDA, R. F.
N79-26184 MITCHELL, P. J.
N79-26762 MITTER, S. K.
MIURA, H.
MOERUP, E.
MOISE, J.
MOLEN, G. M.
MOLINARI, R. L.
N79-26636 MONNA, W. A. A.
N79-26037 MONSLER, M.
N79-26172 MONUKI, A. T.
N79-26337 MOONEY, V.
N79-26859 MOORE, P. L.
N79-26995 MORDUCH, G. E.
N79-26698 MOROSOFF, N.
N79-26452
N79-26434 MORRIS, A. H., JR.
N79-26400 MORRIS, C. D.
N79-26406 MORRIS, C. E. K., JR.
N79-26524 MORRIS, F. A.
N79-26157 MORRIS, M. K.
N79-26535
N79-26536
N79-26779
N79-26852
N79-26870
N79-26303
N79-26498
N79-26715
N79-27053
N79-26840
N79-26735
N79-26198
N79-26839
N79-26198
N79-26411
N79-26415
N79-26083
N79-26051
N79-26947
N79-26256
N79-26692
N79-26054
N79-26370
N79-26793
N79-26578
N79-27032
N79-26134
N79-26612
N79-26467
N79-26856
N79-26141
N79-26653
N79-26511
N79-26822
N79-26356
N79-26515
N79-27006
N79-26251
N79-27036
N79-27037
N79-27038
N79-26562
N79-26783
N79-26987
N79-26741
N79-26486
N79-26906
N79-26597
N79-26933
N79-26391
N79-26009
N79-26312
N79-26440
N79-27024
N79-26409
N79-26436
N79-26524
N79-26500
N79-26911
N79-26529
N79-26780
N79-26433
N79-26739
N79-26457
N79-26496
N79-26656
N79-26040
N79-26234
N79-26236
N79-26136
N79-26679
N79-27036
N79-27037
N79-27038
N79-26957
N79-26304
N79-26659
N79-26700
N79-26234
N79-26236
N79-26490
N79-27035
N79-26015
N79-26759
N79-26867
N79-26762
N79-26379
N79-26830
N79-26811
N79-26435
N79-26780
N79-26313
N79-26759
N79-26738
N79-26524
N79-26087
N79-26772
N79-26747
N79-26093
N79-26211
N79-26220
N79-26814
N79-26438
N79-26881
N79-26768
N79-26768

MORRISON, C. A. N79-26140
MOSELEY, J. T. N79-26592
MOSER, B. J. N79-26756
MOSER, H. N79-26690
MOYER, B. N79-26741
MROZ, T. S. N79-26478
N79-26479
N79-26481
N79-26483
MUELLER, W. N79-26682
MUMMA, C. E. N79-26568
MUNOZ, R. M. N79-26727
MUNROE, J. L. N79-26397
MURCRAY, D. G. N79-26724
MURDIN, J. N79-26266
MURPHY, P. D. N79-26329
MURRAY, J. G. N79-26947
MURRAY, W. N79-26820
MUSSELMAN, K. J. N79-26468
MUTHUKRISHNAN, M. N79-26882
MYATT, B. M. N79-26569
MYER, L. R. N79-26925

N

NAGANO, S. N79-26311
NAGY, F., JR. N79-26041
NAMIE, G. R. N79-26571
N79-26579
NARASIMHA, M. N79-26541
NARDUZZI, J. M. N79-26317
NARENDRA, K. S. N79-26831
N79-26843
N79-26851
NASH, R. N79-26410
N79-26567
NATESH, R. N79-26492
N79-26980
NATUSCH, D. F. S. N79-26145
N79-26547
NAVARRE, J. P. N79-26693
NEALE, D. H. N79-26882
NEICE, S. N79-26384
NEILSON, R. H. N79-26137
NELSON, C. N., JR. N79-26898
NELSON, D. B. N79-26954
NELSON, J. G. N79-27014
NELSON, L. N79-26384
NELSON, V. P. N79-26413
NESS, N. N79-27053
NEUNER, G. J. N79-26517
NEUSTADTER, H. E. N79-26502
NEWMAN, B. E. N79-26396
NEWTON, H. J. N79-26850
NGUYEN, M. N. N79-26208
NIAZ, T. N79-26452
NICKEL, C. E. N79-26107
NICKOLA, P. W. N79-26543
NICOLI, M. N79-26550
NICOSIA, S. N79-26340
N79-26821
NIEDZWIEDZ, T. N79-26627
N79-26652
NISSEN, H. S. N79-26268
NIXON, J. C. N79-26394
NIZIOL, T. A. N79-26037
NOBILIS, F. N79-26691
NOBLE, B. E. N79-26783
NOEL, G. T. N79-26486
NORTON, J. M. N79-26055
NOSSA, G. A. N79-26553
NOURAI, A. N79-26309
NOVAL, C. N79-27032
NUNBERG, P. N79-26900
NYSTROM, P. A. N79-26881

O

ODELL, C. R. N79-27043
OERTER, H. N79-26690
OHARA, D. N79-26721
OHSHIMA, P. N79-26898
OKABAYASHI, M. N79-26947
OKIISHI, T. H. N79-26060
OLEARY, D. P. N79-26853
OLECKI, Z. N79-26685
OLEINICK, P. N. N79-26801
OLIVER, B. F. N79-26182
OLLERHEAD, J. B. N79-26066
OLMSTEAD, D. N. N79-26828
OLSZEWSKI, M. N79-26527
OMEARA, T. R. N79-26386
N79-26932
OMER, F. M. N79-26426
OMID, G. H. N79-26997
ORAN, W. A. N79-26076
N79-26077
OSHIMO, J. N79-27032
OSSAKOW, S. L. N79-26596
N79-26598
OSTERYOUNG, R. A. N79-26138
OSTON, S. G. N79-26924
N79-26925
OSTROSKI, J. N79-26489
OTTAVIANO, A. N79-26339
OVERTON, D. E. N79-27035
OWEN, F. K. N79-26014
OWENS, L. J. N79-26772

P

PABON, H. J. J. N79-26765
PACATI, F. D. N79-26899
PACE, E. N79-26900
N79-26901
PACZOS, S. N79-26679
PAGANO, M. N79-26850
PAGE, W. A. N79-26715
N79-26717
PAGLIARI, M. N79-26638
PAGLIETTI, A. N79-26369
PAGNINO, I. N79-26694
PAIGE, D. N79-26233
PALAU, C. N79-26694
N79-26701
PALLOTTINO, G. V. N79-26280
N79-26339
PALME, J. N79-26823
PALMER, G. N79-27032
PALUTAN, F. N79-26098
PAMPALONI, R. N79-26934
PAN, K. L. N79-26437
PANIGUTTI, A. N79-26276
PAOLONI, A. N79-26274
N79-26285
N79-26287
PAPADALES, B. S., JR. N79-26049
PAPADKIS, J. S. N79-26887
PAPADOPOULOS, K. N79-26944
PARASARATHY, R. N79-26883
PARKER, D. E. N79-26177
PARKER, J. N79-26203
PARR, J. O. N79-27006
PARSONS, S. B. N79-27057
PASCHEN, K. W. N79-26313
PASCU, M. N79-26705
PASK, J. A. N79-26998
PATTEN, D. T. N79-26522
PATTERSON, R. M. N79-26557
PAUL, J. F. N79-26467
PAYNE, K. R. N79-26428
PEAKE, D. J. N79-26014
PEARSON, F. J., JR. N79-26906
PEARSON, L. W. N79-26265
PEAVEY, B. N79-26085
PECHINGER, U. N79-26641
PECK, L. J. N79-27018
PEEL, C. J. N79-26174
N79-26193
PENTZ, D. L. N79-26922
N79-26923
N79-26924
N79-26926
N79-26927
PERKINS, J. F. N79-26394
PERNOT, M. N79-26189
PERRY, J. C. N79-26402
PERUGIA, A. N79-26819
PESCARU, I. U. N79-26663
PETERS, H. G. N79-26099
PETERS, J. G. N79-26094
PETERS, W. L. N79-26362
PETERSEN, B. B. N79-26435
PETERSON, B. E. N79-27029
PETERSON, J. R. N79-26592
PETKOVSEK, Z. N79-26648
PETREQUIN, P. N79-26188
PETRIE, T. W. N79-26939
PHELPS, R. N79-26645
PHELPS, R. E. N79-26130
PHILIPSON, W. R. N79-26440
PHILLIPS, E. P. N79-26427
PHILLIPS, P. D. N79-26644
PIETROIUSTI, R. N79-26281
N79-26286
PIGNATARO, L. J. N79-27024
PIISPANEN, W. N79-26569
PINDROH, A. N79-26384
PIPAL, J. R. N79-26989
PITTMAN, C. U., JR. N79-26210
PLESKO, N. N79-26681
PLEWS, G. D. N79-27031
PLUM, R. L. N79-26904
POJE, D. N79-26649
POLLAK, F. N79-26990
POLLOCK, N. N79-26073
POOLE, P. N79-26174
N79-26193
POPELAR, C. N79-26198
POPPOFF, I. G. N79-26715
PORTAS, J. Y. N79-26240
PORTER, D. W. N79-26090
PORTER, T. R. N79-26120
PORTZ, K. G. N79-26973
POSCETTI, G. M. N79-26281
POSTON, A. M. N79-26786
POTTER, J. N79-26443
PRELEC, K. N79-26951
PREY, S. W. N79-26594
PREZAS, D. P. N79-26310
PRICE, J. E. N79-26063
PRICE, W. G., JR. N79-26947
PRIDGEN, J. I. N79-26327
PRINS, H. W. N79-26764
N79-26774
PRISTOV, J. N79-26640
PRODI, F. N79-26670
PROSCHAN, F. N79-26848
PROSPERI, D. N79-26900
PROW, R. P. N79-26068
PUGLIANI, L. N79-26902
PUK, R. F. N79-26815
PUNWANI, D. V. N79-26232

Q

QIDWAI, H. A. N79-26492
N79-26980
QUARRY, S. T. N79-26893
QUARTERO, C. B. N79-26063
QUIMBY, D. N79-26384

R

RADMER, R. J. N79-26763
RAGETTE, G. N79-26630
RAI-CHOUDHURY, P. N79-26489
RAIMONDO, S. N79-26373
RAJU, S. P. G. N79-26541
RAMBALDELLI, B. N79-26619
RAMSEY, G. H. N79-26555
RANDOLPH, J. N79-27031
RANTAKRANS, E. N79-26712
RAO, T. K. N79-26147
RAPPAPORT, W. H. N79-26778
RASKE, D. T. N79-26434
RASMUSSEN, E. N79-26741
RASMUSSEN, M. L. N79-26026
N79-26028
RASMUSSEN, P. G. N79-26784
RAUERT, W. N79-26690
RAVUSSIN, P. E. N79-26625
RAYFIEL, R. N79-26215
RAYL, G. J. N79-26506
RE, R. J. N79-26022
REARDON, B. A. N79-26800
RECHSTEINER, C. E. N79-26154
RECICAR, S. A. N79-26799
REDDERSEN, B. R. N79-26390
REED, R. E. N79-26328
REED, W. H. N79-26499
REICHEL, E. N79-26708
REIF, H. G. N79-26037
REIF, R. L. N79-26976
REILLY, J. J. N79-26516
REILLY, J. P. N79-26012
REINHARDT, M. E. N79-26677
RESH, V. H. N79-26562
RESNICK, D. R. N79-26069
RESWICK, J. B. N79-26772
REUTER, H. N79-26639
RHODES, C. G. N79-26176
RHODES, R. C. N79-26570
RHORER, R. L. N79-26404
RIBEIRO, J. S. N79-27010
RIBIERE, P. N79-26537
RICCITIELLO, S. R. N79-26100
RICE, R. C. N79-26431
RICHARD, N. A. N79-26486
RICHARDSON, W. L. N79-26467
RICHMAN, D. W. N79-26132
N79-26133
RICHNER, H. N79-26644
N79-26710
RIEDL, J. N79-26624
RIFMAN, S. S. N79-26087
RIORDAN, E. J. N79-27022
RISING, T. L. N79-26418
RISSELL, M. C. N79-26525
ROBBINS, W. H. N79-26504
ROBELLOTO, R. P. N79-26177
ROBERSON, D. R. N79-26265
ROBERTSON, D. J. N79-26563
ROBINS, R. E. N79-26364
ROBINSON, E. N79-26722
N79-26723
ROBINSON, R. S. N79-26943
ROBINSON, S. L. N79-26183
ROCKWAY, J. W. N79-26262
RODDIGER, H. A. N79-26056
ROGAI, S. N79-26273
ROGOFF, P. N79-26947
ROHATGI, A. N79-26489
ROSATI, A. N79-26276
ROSE, G. N79-26196
ROSE, L. L. N79-27007
ROSE, P. L. N79-26107
ROSE, R. B. N79-26256
ROSENBERG, J. T. N79-26377
ROSENFIELD, A. R. N79-26198

ROSKAM, J. N79-26018
ROSSI, C. N79-26284
N79-26337
N79-26859
ROSSI, R. C. N79-26575
ROSSOFF, J. N79-26575
ROUTH, D. E. N79-26475
ROVERI, A. N79-26283
RUBIN, I. B. N79-26231
RUPPE, H. O. N79-26108
RUSCHA, C. P. N79-26744
RUSH, J. D. N79-26837
RUSK, D. N79-26741
RUSSELL, M. N79-26417
RUSSELL, T. P. N79-26202
RUSTAGI, J., S. N79-26845
RUTHERFORD, R. R. N79-26260
RYCHKOV, L. A. N79-27066

S

SABETTA, F. N79-26889
SAHA, P. N79-26293
SAHSAMANOGLOU, H. S. N79-26688
SALERNO, J. P. N79-26214
SALME, G. N79-26901
SALVADORI, P. N79-26902
SAMULON, A. S. N79-26083
SANDBORN, J. W. N79-26058
SANDUSKY, W. F. N79-26543
SANGAL, R. N79-27011
SANTANAM, C. N79-26128
SAVERIONE, B. N79-26272
SAVY, J. B. U. N79-26585
SAWKO, P. M. N79-26100
SCHAAKE, J. C., JR. N79-26451
SCHAEFER, M. N79-26558
SCHAUBERT, D. N79-26254
SCHIESSER, H. H. N79-26707
SCHIFFMAN, M. C. N79-26790
SCHINDLER, A. N79-26211
SCHMID, F. N79-26981
SCHMID, W. N79-26707
SCHMIDLIN, F. J. N79-26719
N79-26729
SCHMIT, L. A., JR. N79-26811
SCHMITT, K. N79-26857
SCHMITTROTH, F. N79-26818
SCHMUCKER, R. H. N79-26108
N79-26113
N79-26114
N79-26115
N79-26116
N79-26117
N79-26118
SCHNEIDER, H. N79-26690
SCHNEIDER, M. N79-26105
SCHRADER, W. T. N79-26382
SCHRAMM, R. N79-26761
SCHRUMPF, B. J. N79-26447
SCHUBERT, F. H. N79-26135
SCHUEEPP, M. N79-26662
SCHULZ, L. R. N79-26212
SCHUMACHER, J. F. N79-26173
SCHUTZ, B. E. N79-26094
SCHWAB, J. R. N79-26316
SCHWARTZ, D. R. N79-26242
SCHWEGLER, H. N79-26637
SCHWEIZER, R. C. N79-26972
SCHWENZFEGER, K. N79-27052
SCOLA, R. N79-26222
SEHITOGLU, H. N79-26842
SEIDENBUSCH, W. N79-26590
SEILA, R. L. N79-26580
SEINFELD, J. H. N79-26613
N79-26614
N79-26615
SEMAN, E. J. N79-26489
SERRA, A. N79-26936
SERRA, C. J. N79-27013
SETTE, D. N79-26935
N79-26936
SHABER, E. L. N79-26395
SHAH, G. N. N79-26241
SHAH, M. L. N79-26390
SHANER, J. W. N79-27000
SHANKAR, R. N79-26414
SHAPLEY, W. H. N79-26454
SHAW, H. R. N79-26906
SHAW, J. H. N79-26586
SHAW, R. P. N79-26261
SHEFT, I. N79-26529
SHEN, Y. D. N79-26473
SHENOY, K. R. N79-26044
SHENSA, M. N79-26320
SHERWOOD, P. J. N79-26112
SHETH, A. C. N79-26519
SHIAU, L. C. N79-26244
SHIPTON, M. S. N79-26890
SHNIDMAN, R. N79-26255
SHORTWELL, C. P. N79-26087
SHRIDER, K. R. N79-26374
SHRINER, C. R. N79-27018
SIADAT, B. N79-26206
SIEGWARTH, J. D. N79-26381
SIEWIOREK, D. N79-26795
SILVA, A. J. N79-26918
SIM, M. E. N79-27046
SIMMON, P. B. N79-26557
SIMMONS, M. J. N79-26125
SIMON, F. F. N79-26503
SINGH, R. P. N79-26107
SINGH, S. N79-26234
SINIK, N. N79-26661
SISTINO, A. N79-26546
SJOLANDER, G. W. N79-26598
SKELTON, E. F. N79-26361
SKERJANEC, R. E. N79-26288
SLABINSKI, V. J. N79-26091
SLATTERY, P. N79-26898
SLAUGHTER, D. R. N79-26956
SLAWSON, G. C., JR. N79-26237
SMALLEY, W. M. N79-27025
SMITH, A. M. O. N79-26031
SMITH, D. L. N79-26747
SMITH, F. N79-26564
SMITH, G. P. N79-26592
SMITH, J. M. N79-26492
N79-26980
SMITH, J. N., JR. N79-26185
SMITH, L. G. N79-26587
SMITH, P. M. N79-26063
SMITH, R. A. N79-26387
SMITH, R. G. N79-26807
SMITH, W. B. N79-26581
SOCKETT, M. N79-26798
SOEDERLUND, R. N79-26740
SOEKS, R. N79-26795
SOENNING, W. N79-26651
SOHM, J. C. N79-26532
SON, B. C. N79-26472
SOO, P. N79-26180
SORENSEN, C. N79-26915
SPANO, P. N79-26338
SPIELMAN, R. B. N79-26941
SPINGARN, J. R. N79-26183
SPITZNAGEL, K. L. N79-26238
SPRANGLE, P. N79-26387
SPRING, S. C. N79-26047
SPURGEON, W. N79-26546
ST.LORANT, S. J. N79-26905
STAGNER, R. T. N79-26398
STAID, P. S. N79-26884
N79-26885
N79-26886
STANKEVICS, J. O. A. N79-26012
STAPLETON, R. W. N79-26489
STAPPAERTS, A. E. N79-26388
STARR, W. L. N79-26720
STAUDINGER, M. N79-26686
STAUFFER, J. L. N79-26154
STEIN, U. N79-26114
N79-26115
STEINACKER, R. N79-26631
STEINBERGER, R. L. N79-26149
STEINMETZ, G. G. N79-26052
STEPHENS, J. J. N79-26749
STERNFELD, H. J. N79-26111
STETTNER, R. N79-26104
STEVENSON, R. E. N79-26754
STEWART, R. D. N79-27002
STICHLER, W. N79-26695
STILES, R. W. N79-26405
STOCHL, R. J. N79-26483
N79-26484
STOCKMAN, G. C. N79-26448
STOCKMAN, N. O. N79-26019
STODDARD, F. S. N79-26471
STOKES, R. L. N79-26314
N79-26315
STOKES, T. R., JR. N79-26031
STOLTZ, R. E. N79-26183
STONE, R. G. N79-26121
STOVALL, R. E. N79-26258
STOWELL, H. R. N79-26786
STRAHLE, W. C. N79-26882
STRANGMAN, T. E. N79-26156
STRICKLAND, G. N79-26518
STRIKWERDA, T. E. N79-26088
STUHLINGER, E. N79-26081
N79-27052
SUENAGA, M. N79-26184
SUN, C. T. N79-26243
SUTTON, D. G. N79-26500
SVIEDRYS, R. N79-27024
SWALLOW, J. E. N79-26218
SZUSZCZEWICZ, E. P. N79-26598

T

TALAVAGE, J. J. N79-26468
TALBERT, D. M. N79-26909
TALBOT, R. N79-26904
N79-26922
N79-26923
N79-26924
N79-26926
N79-26927
TALLEY, H. J., JR. N79-27005
TALWALKAR, A. T. N79-26232
TANIGUCHI, S. N79-26172
TANNER, D. P. N79-26488
N79-26495
TAPLEY, B. D. N79-26094
TARI, U. N79-26055
TARINVARELA, P. M. N79-26425
TASAKI, K. K. N79-26092
TATSUOKA, K. N79-26847
TAUSSIG, R. N79-26384
TAYLOR, W. D. N79-26768
TAYLOR, W. E. N79-26498
TELL, R. A. N79-26290
N79-26779
TEMPELMEYER, K. E. N79-26546
TEMPLIN, A. S. N79-26324
TENHOOR, F. N79-26766
N79-26767
TENTER, K. J. N79-26633
TEPES, E. N79-26704
TESKE, M. E. N79-26566
TESSORE, E. N79-26701
THALLER, L. H. N79-26474
N79-26505
THALMANN, B. N79-26707
THIEME, L. G. N79-27023
THOMAS, G. S. N79-26759
THOMAS, R. E. N79-26101
THOMAS, R. L. N79-26504
THOMAS, R. R. N79-26102
THOMPSON, J. F. N79-26365
THOMPSON, P. M. N79-26844
THOMPSON, S. N. N79-26919
THOMPSON, W. A. N79-26970
THORNTON, E. A. N79-26402
THUNBORG, S., JR. N79-26530
TIEN, K. K. N79-26011
TIERNEY, M. S. N79-26906
TILDEN, S. B. N79-26794
TIMONEY, R. M. N79-26876
TISDALE, G. E. N79-26085
TOBENFELD, E. N79-26822
TODOROVIC, N. N79-26659
N79-26700
TOLAND, R. H. N79-26121
TOMBACH, I. H. N79-26016
TOMKINS, B. A. N79-26147
TONEATTO, G. M. N79-26420
TOWNSEND, J. H. N79-26321
TRAINER, M. N. N79-26561
TRAN, T. S. N79-26534
TRENDEL, R. N79-26619
TREVES, S. R. N79-26271
N79-26282
TRIMMER, P. A. N79-26987
TRITTON, S. B. N79-27046
TROI, V. N79-26889
TROMP, W. S. N79-26650
TROXLER, W. L. N79-27035
TRUITT, R. E. N79-27034
TRUMPY, S. N79-26098
TSAI, M. Y. N79-26975
TSENG, B. N79-26306
TSOTSIS, T. T. N79-26129
TSUBOI, J. I. N79-26199
TUGNAIT, J. K. N79-26874
TURNER, D. H. L. N79-26348
TURNER, J. H. N79-26453
TURNER, L. R. N79-26960
TURNQUIST, D. V. N79-26319
TURPEINEN, O. N79-26714
TYLER, D. E. N79-26865
TYSON, B. J. N79-26721

U

UEDA, M. N79-26210
UHRHAMMER, T. J. N79-26780
UNCAPHER, K. W. N79-26792

V

VAAJAMA, P. N79-26712
VALIBUS, L. N79-26188
VANBENSCHOTEN, J. N79-26462
N79-26464
VANDAM, C. P. G. N79-26018
VANDERHAMER, C. J. A. N79-26764
N79-26774
N79-26775
VANDERHOFF, J. W. N79-26136
VANDERWOLF, L. N79-26765
VANDORP, D. A. N79-26765
VANDRE, R. H. N79-26313
VANSTRATUM, P. N79-26777
VANTINE, H. N79-26377
VARRESE, F. N79-26406
VAUGHAN, J. A. N79-26784
VEDDER, J. F. N79-26721
N79-26728
VEER, J. A. N79-26217
VELTHUYS, B. N79-26763

VILLANTE, U. N79-27050
VIVIAN, H. N79-26692
VLES, R. N79-26776
VOGLER, F. H. N79-26101
N79-26102
VOIRON, H. N79-26680
VOLZ, R. N79-26654
VOUGHT, C. D. N79-26374

W

WAGNER, T. W. N79-26456
WAGONER, D. E. N79-26564
WAIBEL, R. T. N79-26143
WAKEFIELD, A. R. N79-26218
WALDVOGEL, A. N79-26707
WALIGORA, S. N79-26086
WALKER, C. D. N79-26132
N79-26133
WALKER, D. N. N79-26598
WALKER, P. N79-26524
WALLACE, R. W. N79-26101
N79-26102
WAMPLER, B. E. N79-26808
WANG, G. N. N79-26841
WANG, S. T. N79-26960
WARD, R. C. N79-26552
WARNAR, R. B. J. N79-26799
WASHBURN, G. F. N79-26063
WEAVER, J. E. N79-26371
WEBER, B. N79-26758
WEBER, G. N79-26708
WEBER, J. H. N79-27034
WEBER, R. M. N79-26055
WEBSTER, J. S. N79-26040
WEDNER, R. J., JR. N79-26245
N79-26246
WEICKMANN, H. K. N79-26750
WEIGAND, B. L. N79-26212
WEIKEL, S. N79-26795
WEINER, A. J. N79-27024
WEINGART, R. N79-26377
WEISS, M. A. N79-26264
WEISS, R. A. N79-26132
N79-26133
WELCH, D. O. N79-26184
WELLS, M. E. N79-26526
WELSCH, R. E. N79-27004
WELSH, K. W. N79-26784
WERNER, A. S. N79-26569
WERTHEIMER, A. L. N79-26561
WEST, J. B. N79-26388
WESTBROOK, C. K. N79-26150
WESTBROOK, R. M. N79-26762
WESTON, R. P. N79-26020
WEYLAND, P. N79-26537
WHITAKER, H. P. N79-26062
WHITE, G. R. N79-26053
WHITE, H. V. N79-26375
WHITE, R. S. N79-26988
WHITE, S. G., JR. N79-26307
WHITFIELD, C. E. N79-26066
WHITT, W. D. N79-26075
WHITTEN, G. Z. N79-26613
N79-26614
N79-26615
WICKERSHAM, C. E., JR. N79-26155
WIDLUND, O. N79-26853
WIHL, G. N79-26691
WILBER, K. R. N79-26545
WILCOX, D. E. N79-26035
WILKINSON, J. H. N79-26863
N79-26864
N79-26677
WILLEKE, H. N79-26797
WILLIAMS, J. A. N79-26768
WILLIAMS, L. R. N79-26809
WILLIAMS, R. L. N79-27031
WILLIAMS, T. C. N79-26724
WILLIAMS, W. J. N79-26610
WILSON, F. W. N79-26214
WILSON, L. K. N79-26656
WINIGER, M. N79-26969
WINOTAI, P. N79-26795
WIOREK, D. N79-26709
WITTE, N. N79-26613
WOJCIK, M. A. N79-26614
N79-26615
WOLD, A. N79-26982
WOLF, H. W. N79-27033
WOLF, M. N79-26485
WOLFOWICZ, W. N79-26281
N79-26286
N79-26337
N79-26859
WOLKEN, G., JR. N79-26392
WOO, K. C. E. N79-26971
WOO, W. Y. N79-26940
WOOD, P. D. N79-26731
WOOD, V. E. N79-26486
WOODROFFE, J. A. N79-26012
WOODS, R. R. N79-26135
WOOLDRIDGE, G. L. N79-26664
WORTMAN, D. E. N79-26140
WRAY, J. D. N79-27057
WU, S. T. N79-26076
N79-26079
N79-26080
WYANT, J. C. N79-26376

Y

YANG, T. Y. N79-26244
YASUDA, H. N79-26220
YASUDA, T. N79-26199
YAWS, C. L. N79-26487
YEN, A. T. N79-26521
YEN, T. F. N79-26237
YIM, K. W. K. N79-26126
YOO, H. I. N79-26488
N79-26495
YOUNG, C. W. N79-26569
YOVITS, M. C. N79-27007
YUAN, J. C. N79-27008

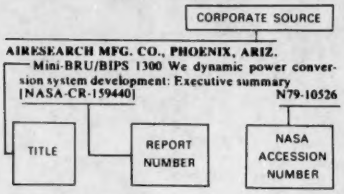
Z

ZAHOOR, A. N79-26419
ZALAY, A. D. N79-26374
ZALEWSKI, R. A. N79-26308
ZANELLA, G. N79-26702
ZENOBI, T. J. N79-26036
N79-26038
ZIEGLER, L. N79-26443
ZIMMERMAN, J. R. N79-26744
ZIMMERMAN, M. N79-26707
ZIRKLE, A. L. N79-26813
ZORV, R. B. N79-27002
ZUELLIG, W. N79-26628
ZUREY, F. T. N79-26167

CORPORATE SOURCE INDEX

SCIENTIFIC AND TECHNICAL AEROSPACE REPORTS VOLUME 17 NUMBER 17

Typical Corporate Source Index Listing



Listings in this index are arranged alphabetically by corporate source. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document cited (e.g., NASA report, translation, NASA contractor report). The NASA accession number denotes the number by which the citation is identified. The titles are arranged under each corporate source in ascending accession number order.

A

ABCOR, INC., WILMINGTON, MASS.
Growth effects of major land use projects [wastewater facilities]. Volume 2: Summary, predictive equations and worksheets
[PB-293229/1] N79-26572
ACRES AMERICAN, INC., BUFFALO, N. Y.
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919
ACUREX CORP., MOUNTAIN VIEW, CALIF.
Design of a 150 kWe distributed collector solar thermal power station
[AED-CONF-78-212-013] N79-26517
Proceedings: Third Workshop on catalytic combustion
[PB-293336/4] N79-26548
ADMIRALTY UNDERWATER WEAPONS ESTABLISHMENT, PORTLAND [ENGLAND].
Microstructural characterization of cast nickel aluminum bronze
[AUWE-TN-580/78] N79-26196
AEROJET LIQUID ROCKET CO., SACRAMENTO, CALIF.
Development of an electrical energy converter for driving left heart assist blood pumps
[PB-293510/4] N79-26780
AERONAUTICA MILITARE ITALIANA, ROME.
Outline of Apennine meteorology
N79-26655
AERONAUTICAL RESEARCH ASSOCIATES OF PRINCETON, INC., N. J.
Predictions of highway emissions by a second order closure model
[PB-292703/6] N79-26566
AERONAUTICAL RESEARCH LABS., MELBOURNE [AUSTRALIA].
An experimental comparison of the readability of two digital altimeters
[ARL/SYS-NOTE-60] N79-26053
A simple method of adapting a wind tunnel Schlieren system for interferometry
[AD-A067233] N79-26073
AEROSPACE CORP., EL SEGUNDO, CALIF.
Effect of vibrational excitation in reactions of OH with H2
[AD-A058571] N79-26134
Transient radiation and dose-enhancement effects in transistors
[AD-A067629] N79-26313
Improved camera-tube performance with pulsed operation
[AD-A067336] N79-26317
Low cost solar array project: Composition measurements by analytical photon catalysis
[NASA-CR-158737] N79-26500
Assessment of an empirical technique for estimating vehicle aerodynamic drag from vehicle shape parameters
[PB-292160/9] N79-27025
AEROSPACE CORP., LOS ANGELES, CALIF.
Disposal of by-products from nonregenerable flue gas desulfurization systems
[PB-293163/2] N79-26575
AIR FORCE AERO PROPULSION LAB., WRIGHT-PATTERSON AFB, OHIO.
Fuel hydrogen content as an indicator of radiative heat transfer in an aircraft gas turbine combustor
[AD-A067709] N79-26224
AIR FORCE AVIONICS LAB., WRIGHT-PATTERSON AFB, OHIO.
Optimal feedback controls for parameter identification
[AD-A067265] N79-26828
AIR FORCE ENGINEERING TECHNOLOGY OFFICE, TYNDALL AFB, FLA.
An evaluation of the bird/aircraft strike hazard Dyess Air Force Base, Texas
[AD-A068026] N79-26039
AIR FORCE GEOPHYSICS LAB., HANSCOM AFB, MASS.
Modeling of the geosynchronous orbit plasma environment. Part 3: ATS-5 and ATS-6 pictorial data atlas
[AD-A067843] N79-26597
AIR FORCE HUMAN RESOURCES LAB., BROOKS AFB, TEX.
Air Force female pilots program: Initial performance and attitudes
[AD-A065641] N79-26783
AIRBORNE RESEARCH ASSOCIATES, WESTON, MASS.
Airborne measurements in support of a field test of the stabilization of supersized water droplets: Pilot experiment
[AD-A067645] N79-26735
AIRESEARCH MFG. CO., PHOENIX, ARIZ.
Alternate subsonic low-cost engine
[AD-A067277] N79-26058
Ceramic gas turbine engine demonstration program
[AD-A067970] N79-26059
ALABAMA UNIV., UNIVERSITY.
Synthesis of polyesters containing tetrathiafulvalene groups in the backbone
[AD-A066972] N79-26210
ALABAMA UNIV. IN HUNTSVILLE.
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Research Association
N79-26079
Report of the Ad Hoc Committee on the assessment of models of a wake shield environment around various spacecraft, Universities Space Res. Association
N79-26080
Research on resonant charge-exchange X-ray and ultraviolet lasers
[AD-A067227] N79-26391
ALASKA UNIV., FAIRBANKS.
Investigation of the phenomenology of the Arctic ionosphere and its relation to the phenomenology of Arctic particle precipitation, part 1
[AD-A067711] N79-26595
AMERICAN SOCIETY OF MECHANICAL ENGINEERS, NEW YORK.
Flaw evaluation procedures
[EPRI-NP-719-SR] N79-26415
AMES LAB., IOWA.
Characterization of a Fabry-Perot interferometer and a dc arc plasma jet for spectrochemical analysis
[IS-T-815] N79-26144
Design of rf power amplifiers [high and low Q] and lumped equivalent circuits of transmission lines with NMR applications
[IS-4596] N79-26329
Lattice parameters of iron-aluminum silicon alloys with the DO3 structure
[IS-T-831] N79-26992
Thermodynamic properties of uranium-mercury system
[IS-T-824] N79-26999
ANALYTIC SCIENCES CORP., READING, MASS.
Information base for waste repository design. Volume 5: Decommissioning of underground facilities
[PB-293405/7] N79-26904
Information base for waste repository design. Volume 1: Borehole and shaft sealing
[PB-293401/6] N79-26922
Information base for waste repository design. Volume 2: Equipment performance requirements
[PB-293402/4] N79-26923
Information base for waste repository design. Volume 3: Waste/rock interactions
[PB-293403/2] N79-26924
Information base for waste repository design. Volume 4: Mine structural features
[PB-293404/0] N79-26925
Information base for waste repository design. Volume 6: Excavation technology
[PB-293406/5] N79-26926
Information base for waste repository design. Volume 7: Executive summary
[PB-293407/3] N79-26927
ANALYTICAL METHODS, INC., BELLEVUE, WASH.
A viscous/potential flow interaction analysis for circulation-controlled airfoils
[AD-A067913] N79-26030
APPLIED PHYSICS LAB., JOHNS HOPKINS UNIV., LAUREL, MD.
Bumblebee program aerodynamic data. Part 3: Pressure fields at Mach numbers 1.5 to 2.0
[NASA-CR-3116] N79-26021
APPROPRIATE TECHNOLOGY GROUP, OSKALOOSA, KANS.
Wind driven water pumps. Economics, technology, current activities
[PB-292816/6] N79-26542
ARGONNE NATIONAL LAB., ILL.
Gas bubble and damage microstructure in helium implanted nickel
[CONF-780851-4] N79-26178
Effects of notches on elevated-temperature, low-cycle fatigue behavior of type 204 stainless steel
[CONF-781202-25] N79-26434
Evaluation of available MHD seed-regeneration processes on the basis of energy considerations
[ANL/MHD-78-4] N79-26519
Survey of disruption and consumer costs resulting from a major residential power outage
[ANL/EES-TM-29] N79-26520
HYCSOS chemical heat pump and energy conversion system
[CONF-781142-7] N79-26529
Control of sulfur dioxide and particulate emission in MHD power systems using high sulfur coal
[CONF-781109-18] N79-26546
Pulsed neutron measurement of single and two-phase liquid flow
[CONF-781113-31] N79-26896
Alternative waste management options, Nuclear Fuel Services, Inc., high level waste
[ANL-K-78-4190-2] N79-26908
Implications of nucleon-nuclear spin-polarization measurements
[ANL-HEP-CP-78-48] N79-26915
Fusion power program
[ANL/FPP-78-2] N79-26953
Stability calculations for MHD magnets
[CONF-781055-4] N79-26960
ARIZONA STATE UNIV., TEMPE.
Workshop on Ecological Impacts of Solar Energy Conversion
[COO-4339-4] N79-26522
ARIZONA UNIV., TUCSON.
Design and analysis of integrated electrothermal filters
N79-26295
Fabrication and testing of a sensitive ultraviolet-visible silicon photodiode device
N79-26370
Holographically improved windows
[AD-A067914] N79-26376
CONVERS: An interpretive compiler
[AD-A067746] N79-26794

ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, ABERDEEN PROVING GROUND, MD.
Computer simulation of electron-beam-cavity interactions in coaxial geometry
[AD-A066130] N79-26255
ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, DOVER, N. J.
The characterization of a slurry explosive: Teledet
[AD-A066942] N79-26223
ARMY ARMAMENT RESEARCH AND DEVELOPMENT COMMAND, FORT MONMOUTH, N. J.
Design charts for torsional properties of non-circular shafts
[AD-A064109] N79-26401
ARMY AVIATION ENGINEERING FLIGHT ACTIVITY, EDWARDS AFB, CALIF.
Preliminary airworthiness evaluation AH-1S helicopter equipped with a Garrett infrared radiation suppressor and an AN/ALQ-144 jammer
[AD-A067757] N79-26047
ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N. H.
Effect of water content on the compressibility of snow-water mixtures
[AD-A066936] N79-26589
Blank corrections for ultratrace atomic absorption analysis
[AD-A066979] N79-26893
ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
Thermogravimetric analysis of solid refuse-derived fuels and coal
[AD-A067829] N79-26225
ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Acoustic-to-seismic coupling properties and applications to seismic sensors
[AD-A067348] N79-26591
ARMY MISSILE RESEARCH AND DEVELOPMENT COMMAND, REDSTONE ARSENAL, ALA.
Gyrocompassing error analysis for Pershing 2 inertial measurement unit
[AD-A067516] N79-26375
ARO, INC., ARNOLD AIR FORCE STATION, TENN.
Online monitoring of compressor blade stress: An improved system
[AD-A067403] N79-26061
Jet simulation techniques: Simulation of temperature effects by altering gas composition
[AD-A067084] N79-26362
ASPEN CORP., GERMANTOWN, MD.
Land and natural resources management: An analysis of selected Federal policies programs, and planning mechanisms. Report to the President's Interagency Task Force on Environmental Data and Monitoring Programs
[PB-292500/6] N79-26449
ATLANTIC RESEARCH CORP., ALEXANDRIA, VA.
Erosive burning of composite solid propellants: Experimental and modeling studies
[AD-A067649] N79-26227
ATMOSPHERIC SCIENCES LAB., WHITE SANDS MISSILE RANGE, N. MEX.
The 12831D Lance missile no. 2486, round no. 325 DSL [18 January 1979]
[AD-A067675] N79-26734
AUBURN UNIV., ALA.
Fault simulation, analysis and diagnosis of a microprocessor
N79-26790
AVCO-EVERETT RESEARCH LAB., MASS.
Pulsed-laser-generated impulse on a surface in supersonic flow
[LOG-J-10741] N79-26012

B

BALL BROS. RESEARCH CORP., BOULDER, COLO.
Microstrip millimeter wave antenna study
[AD-A067948] N79-26264
BARI UNIV. [ITALY].
Comparison between two calculation procedures for internal combustion engine exhaust systems
N79-26406
Potential marine pollution from the Cavtat shipwreck
N79-26549
BARRY [THEODORE] AND ASSOCIATES, LOS ANGELES, CALIF.
SAMICS validation. SAMICS support study, phase 3
[NASA-CR-158746] N79-26491
BATTELLE COLUMBUS LABS., OHIO.
Computer-aided analysis and design of the shape rolling process for producing turbine engine airfoils
[NASA-CR-135367] N79-26175
Critical experiments, measurements and analyses to establish a crack arrest methodology for nuclear pressure vessel steels
[PB-292777/0] N79-26198
Fuel contaminants. Volume 3: Control of coal-related pollutants
[PB-293328/1] N79-26234
Fuel contaminants, volume 4: Application of oil agglomeration to coal wastes
[PB-293210/1] N79-26236
Computational study of chemical reaction dynamics at the gas-solid interface
[AD-A067854] N79-26392
Evaluation of equivalent initial flaws for damage tolerance annalysis
[AD-A067566] N79-26431
Measurement techniques and instruments suitable for life-prediction testing of photovoltaic arrays
[NASA-CR-158733] N79-26486
Evaluation of selected chemical processes for production of low-cost silicon, phase 3
[NASA-CR-158739] N79-26977
BATTELLE PACIFIC NORTHWEST LABS., RICHLAND, WASH.
Characterizing dispersion on a climatological basis
[PNL-SA-6832] N79-26543
Storage and disposal of radioactive waste as glass in canisters
[PNL-2764] N79-26911
BAYERISCHES LANDESAMT FUER UMWELTSCHUTZ, MUNICH [WEST GERMANY].
Air purification in the Alpine region
N79-26637
BELGRADE UNIV. [YUGOSLAVIA].
The effects of the Alps and the Carpathians on climate of the Pannonian Plain in Yugoslavia
N79-26659
Some mesoscale meteorological phenomena induced by the mountain
N79-26672
The ratio of the number of days with snow cover to that with snowfall in the Serbian Mountains of Yugoslavia
N79-26700
BENDIX CORP., KANSAS CITY, KANS.
Equipment for a laser surface measuring system
[BDX-613-1848-REV] N79-26398
Slotting by electrochemical grinding
[BDX-613-1908-REV] N79-26405
BENDIX CORP., KANSAS CITY, MO.
Time-temperature correspondence of the dynamic mechanical properties of halthane 73-18 and halthane 87-1
[BDX-613-1867-REV] N79-26151
Deposition of aluminum-copper alloy on laminated polyimide substrates from an RF induction source
[BDX-613-1993-REV] N79-26186
Quantitative comparison of electronic component-solder joint stress relief in encapsulated assemblies
[BDX-613-1868-REV] N79-26333
BERN UNIV. [SWITZERLAND].
A comparison between the Bernese Jura and Bernese Alps, based on the spring and autumn phenologic phases
N79-26654
Recent and ice age climatic ecological arrangement of the African high mountains between the Mediterranean and the equator
N79-26656
BOEING AEROSPACE CO., SEATTLE, WASH.
Evaluation of flawed composite structural components under static and cyclic loading
[NASA-CR-135403] N79-26120
BOSTON COLL., CHESTNUT HILL, MASS.
Research on an automated inertial azimuth measuring system
[AD-A067938] N79-26043
BOSTON UNIV., MASS.
A perturbation method for the periodic solutions of a discontinuous system of differential equations
N79-26837
Investigations of distant field stars and clusters in the galactic anticenter
N79-27040
BROOKHAVEN NATIONAL LAB., UPTON, N. Y.
Effect of fission product interactions on the corrosion and mechanical properties of HTGR alloys
[BNL-NUREG-25325] N79-26180
Degradation mechanism of Nb3Sn composite wires under tensile strain at 4.2 K
[BNL-24957] N79-26184
Development of a glass polymer composite sewer pipe from waste glass
[BNL-50886] N79-26215
Properties of superconducting Nb3Si
[BNL-24949] N79-26330
Metal hydride research and development program at Brookhaven National Laboratory
[BNL-25215] N79-26516
Hydrogen storage devices for automobiles
[BNL-25263] N79-26518
Gabor lens theory
[BNL-25023] N79-26913
Beam foil spectroscopy of heavy ions at energies from 20 to 238 MeV
[BNL-24909] N79-26916
Negative ion based neutral beams for plasma heating
[BNL-24782] N79-26951
BROWN UNIV., PROVIDENCE, R. I.
Interband transitions of semiconducting oxides determined from photoelectrolysis spectra
[AD-A066188] N79-26982
BUREAU OF MINES, RENO, NEV.
Catalytic properties of natural and rare-earth-promoted manganese nodules
[PB-293267/1] N79-26200
BURROUGHS CORP., PAOLI, PA.
Numerical aerodynamic simulation facility feasibility study, executive summary
[NASA-CR-152284] N79-26071
Numerical aerodynamic simulation facility feasibility study
[NASA-CR-152285] N79-26072
BUSINESS AND TECHNOLOGICAL SYSTEMS, INC., SEABROOK, MD.
Multiple object tracking with non-unique data-to-object association via generalized hypothesis testing
N79-26090

C

CALIFORNIA INST. OF TECH., PASADENA.
Metastable superconducting alloys
[CALT-822-104] N79-26181
Tsunamis: The propagation of long waves onto a shelf
N79-26753
CALIFORNIA UNIV., BERKELEY.
An evaluation of the effects of geothermal energy development on aquatic biota in the geysers area of California
[PB-293031/1] N79-26562
Crossed molecular beam study of the reactions of oxygen and fluorine atoms
[AD-A067848] N79-26894
CALIFORNIA UNIV., BERKELEY. LAWRENCE BERKELEY LAB.
Bonding in inorganic compounds: A study by X-ray photoelectron spectroscopy
[LBL-8294] N79-26142
Detection and measurements of air pollutants and constituents by millimeter-wave microwave spectroscopy
[LBL-7986] N79-26544
Temperature measurements in the TORMAC 4-c plasma
[LBL-8166] N79-26959
Thermodynamics and mechanisms of sintering
[LBL-8419] N79-26998
CALIFORNIA UNIV., DAVIS.
The production of ethanol from agricultural waste: An economic evaluation
[PB-292552/7] N79-26233
Performance prediction of computer architectures operating on linear mathematical models
N79-26789
Stability of the critical surface in the presence of strong electromagnetic radiation
N79-26940
Experimental observation of strong profile modification of an inhomogeneous plasma due to intense microwaves
N79-26941
CALIFORNIA UNIV., IRVINE.
Contact spaces for singularities over perfect fields
N79-26834
Optical transmission characterization of flash evaporated amorphous Se-Ge films
N79-26929
Some applications of Green's functions to the study of the effects of surfaces on the dynamical properties of elastic solids
N79-26973
CALIFORNIA UNIV., LIVERMORE. LAWRENCE LIVERMORE LAB.
Prototype development of an optimized, tapered-thickness, graphite/epoxy composite flywheel
[UCRL-52623] N79-26121
Fuel motion and pollutant formation in stratified charge combustion
[UCRL-81155] N79-26150
Fabrication of manganin stress gauges for use in detonating high explosives
[UCRL-81371] N79-26377
LLL wind energy studies [OAHU]
[UCRL-82171] N79-26514
Electric power from laser fusion: The HYLIFE concept
[UCRL-81259-REV-1] N79-26524
Atomic reaction rates in H[-] and D[-] plasmas
[UCID-18031] N79-26948
Laser fusion diagnostics
[UCRL-81099-REV-1] N79-26949
Laser fusion: Status, future, and tritium control
[UCRL-81946] N79-26950
Plasma neutron diagnostic techniques with good spatial and energy resolution
[UCRL-81120] N79-26956
Thermodynamic characterization of liquid metals at high temperature by isobaric expansion measurements
[UCRL-80114] N79-27000

CALIFORNIA UNIV., LOS ANGELES.
Raman studies of the orientational motions of small diatomics dissolved in argon, 1; and molecular dynamics simulation of rare gas films adsorbed on the basal plane of graphite, 2
N79-26122
High temperature deformation of solid solution strengthened superalloys
N79-26165
Theory of charge pumping in MOS transistors
N79-26301
Effects of surface states on the low frequency transfer inefficiency in CCD's
N79-26302
A study of conditional instability of the second kind and a numerical simulation of the intertropical convergence zone and easterly waves
N79-26583
NEWSUMT: A FORTRAN program for inequality constrained function minimization, users guide
[NASA-CR-159070] N79-26811
Stimulated Brillouin sidescatter and backscatter of carbon dioxide laser radiation from a laser altered arc plasma
N79-26937
Analytical theory of drift waves and drift Alfven waves in tokamaks
[PPPL-1512] N79-26958
CALSPAN CORP., BUFFALO, N. Y.
An operational research investigation of the ice-detection capability and utility of the surface condition analyzer [SCAN] system and its applicability to Navy-wide use
[AD-A067174] N79-26037
CANADA CENTRE FOR REMOTE SENSING, OTTAWA [ONTARIO].
CCRS airborne program assessment. Volume 1: Analysis
[PB-293161/6] N79-26469
CCRS airborne program assessment. Volume 2: User reports
[PB-293162/4] N79-26470
CANADA INST. FOR SCIENTIFIC AND TECHNICAL INFORMATION, OTTAWA [ONTARIO].
The kinetics of the oxidation of graphite by an impinging jet of gas
[NRC/CNR-TT-1938] N79-26172
Solubility of oxygen in pure iron from the melting point to 2046 deg C determined using the levitation melting method
[NRC/CNR-TT-1942] N79-26173
CARNEGIE-MELLON UNIV., PITTSBURGH, PA.
The effects of microstructure and strength on the fracture toughness of ultra-high strength aluminum alloys
N79-26159
Structure of 001 grain boundaries in bicrystalline thin films of gold
N79-26166
The implementation and evaluation of parallel algorithms on C.mmp
N79-26801
Automatically decomposing signal processing applications on multiprocessors
N79-26806
The elastic-plastic dangling spider problem
N79-26835
CATHOLIC UNIV. OF AMERICA, WASHINGTON, D. C.
Analytic models for the treatment of alternant linear heteropolymers
N79-26203
A study of inflow characteristics in a stratified fluid
N79-26349
CEE JOINT RESEARCH CENTER, ISPRA [ITALY].
Solar radiation and valley breeze in the southern parts of the Alps
N79-26647
CENTRAAL INSTITUUT VOOR VOEDINGSONDERZOEK TNO, ZEIST [NETHERLANDS].
Physiological effects of a high soybean protein diet in man
N79-26777
CENTRAL ELECTRICITY GENERATING BOARD, BRISTOL [ENGLAND].
Multichannel pressure sampling and storage system
[TDB-318] N79-26380
Data reduction in the eddy current testing of condenser tubes
[TDB-314] N79-26417
CENTRAL ELECTRICITY GENERATING BOARD, HARROGATE [ENGLAND].
Pulverised fuel non-return flap valve
[TDB-317] N79-26408
CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE, GRENOBLE [FRANCE].
Spatial and temporal fluctuations of precipitations within an intra-Alpine area as function of general atmospheric circulation [examples taken in Savoy]
N79-26692
CHALMERS UNIV. OF TECHNOLOGY, GOTEBORG [SWEDEN].
An iterative solver for a mixed variable variational formulation of the [first] biharmonic problem
[CTH-78.02-R] N79-26860
Conjugate gradient type methods for unsymmetric and inconsistent systems of linear equations
[CTH-78.03-R] N79-26861
CITY-WIDE DEVELOPMENT CORP., DAYTON, OHIO.
City-wide Development Corporation development services package
[PB-292972/7] N79-27028
CITY UNIV. OF NEW YORK.
A numerical solution technique for three-dimensional multiparticle Stokes flows
N79-26345
Turbulent and fast fluidization [high velocity fluidization]
N79-26348
CIVIL AEROMEDICAL INST., OKLAHOMA CITY, OKLA.
Index to FAA Office of Aviation Medicine reports: 1961 through 1978
[AD-A067983] N79-26773
The optical properties of smoke-protective devices
[FAA-AM-78-41] N79-26784
CIVIL AERONAUTICS BOARD, WASHINGTON, D.C.
Airport activity statistics of certificated route air carriers
[AD-A067924] N79-26074
CLEMENT ASSOCIATES, INC., WASHINGTON, D. C.
Third report of the TSCA Interagency Testing Committee to the administrator, Environmental Protection Agency
[PB-293378/6] N79-26465
COGAN AND ASSOCIATES, PORTLAND, OREG.
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
COLORADO SCHOOL OF MINES, GOLDEN.
A pore model for gasification reactions: An application to the system C-CO2-CO-N2
N79-26127
Liquid-vapor equilibrium measurement and prediction of the binary and ternary systems consisting of methane, ethane, and carbon dioxide at 270.00 K
N79-26130
The effect of manganese and nickel additions in the welding flux on the fusion zone of pearlitic ductile iron
N79-26164
Stabilization of the plutonium delta phase in the plutonium-gallium-zirconium ternary phase equilibria system
N79-26167
The prediction of geysering in fluid transfer lines by flooding theory
N79-26346
A thermal activation analysis of cyclic creep in Al-4.6% Mg
N79-26418
Enthalpy measurements for coal-derived liquids
N79-26997
COLORADO STATE UNIV., FORT COLLINS.
Inert gas thrusters
[NASA-CR-159527] N79-26110
Electrochemical and spectral investigations of Ni[II] ion equilibria in room temperature chloroaluminate solvents
[AD-A067782] N79-26138
Formation and transformation of polycyclic organic matter from coal combustion
[COO-4347-1] N79-26145
Wind excited motion of buildings
N79-26239
Institutional arrangements for effective water management in Colorado
[PB-293647/4] N79-26466
Characterization of fly ash from coal combustion
[COO-4347-4] N79-26547
Regulatory water quality monitoring. A systems perspective
[PB-292756/4] N79-26552
Tropospheric radiative divergence during phase 3 of the GARP Atlantic Tropical Experiment [GATE]
[PB-292761/4] N79-26609
Wind characteristics over ridges
N79-26618
Mountain winds in the plains
N79-26645
Diagnostic analyses of the GATE A/B scale area at individual time periods
[PB-292961/0] N79-26743
Diurnal variability in the GATE [GARP Atlantic Tropical Experiment] region
[PB-292998/2] N79-26751
Physical processes in directed ion beam sputtering
[NASA-CR-159567] N79-26943
Development of a drainage with flood control management system for urbanizing communities
N79-27022
COLUMBIA UNIV., NEW YORK.
High temperature properties of nuclear reactor coolants and thermodynamic power cycle working Fluids
[COO-3027-37] N79-27001
COMMITTEE ON ENERGY AND NATURAL RESOURCES [U. S. SENATE].
Executive energy documents
[GPO-24-112] N79-26507
Energy: Fiscal year 1980 budget request
[GPO-42-886] N79-26508
The National Energy Act
[GPO-36-956] N79-26509
COMMITTEE ON GOVERNMENTAL AFFAIRS [U. S. SENATE].
Federal Information Centers Act
[S-REPT-95-1129] N79-27009
COMMITTEE ON SCIENCE AND TECHNOLOGY [U. S. HOUSE].
National Weather Service Act of 1978
[GPO-31-606] N79-26730
COMPUTER HORIZONS, INC., CHERRY HILL, N. J.
International science indicators: Development of indicators of international scientific activity using the science citation index
[PB-293033/7] N79-27020
COMPUTER SCIENCES CORP., EL SEGUNDO, CALIF.
Orbit/attitude estimation with LANDSAT Landmark data
N79-26086
CONNECTICUT UNIV., STORRS.
Thermal fatigue of oxidation resistant overlay coatings for superalloys
N79-26156
Photodegradation and biodegradation of some polymers containing carbonyl groups
N79-26201
CONSIGLIO NAZIONALE DELLE RICERCHE, BOLOGNA [ITALY].
Transport and deposition of Saharan dust over Alps
N79-26670
CONSIGLIO NAZIONALE DELLE RICERCHE, FRASCATI [ITALY].
Low-noise preamplifier for gravitational wave experiments
[I.PS-78-11] N79-26339
CONTROL DATA CORP., ST. PAUL, MINN.
Feasibility study for a numerical aerodynamic simulation facility: Summary
[NASA-CR-152286] N79-26067
Feasibility study for a numerical aerodynamic simulation facility. Volume I
[NASA-CR-152287] N79-26068
Feasibility study for a numerical aerodynamic simulation facility. Volume 2: Hardware specifications/descriptions
[NASA-CR-152288] N79-26069
Feasibility study for a numerical aerodynamic simulation facility. Volume 3: FMP language specification/user manual
[NASA-CR-152289] N79-26070
CORNELL UNIV., ITHACA, N. Y.
Stress relaxation in coiled ribbons of Fe40Ni40P14B6 and Fe29Ni49P14B6Si2
[AD-A068000] N79-26432
Remote sensing program
[E79-10211] N79-26440
Airborne infrared and submillimeter astronomical polarization measurements at different wavelengths
[NASA-CR-158751] N79-27044
Gravitational time delay in orthogonally polarized radiation passing by the sun
[NASA-CR-158757] N79-27049
COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH, PRETORIA [SOUTH AFRICA].
CSIR annual report, 1978
[AR-34] N79-27061
CRYSTAL SYSTEMS, INC., SALEM, MASS.
Silicon ingot casting, heat exchanger method multi-wire slicing, fixed abrasive slicing technique. Phase 3: Silicon sheet growth development for the large area sheet task of the low-cost solar array project
[NASA-CR-158734] N79-26981

D

DANISH METEOROLOGICAL INST., COPENHAGEN.
Thule Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-131-6] N79-26601
Thule Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-132-4] N79-26602
Thule Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-133-2] N79-26603
Godhavn Geophysical Observatory: Magnetic results, 1971
[ISBN-87-7478-128-6] N79-26604
Godhavn Geophysical Observatory: Magnetic results, 1972
[ISBN-87-7478-129-4] N79-26605

Godhavn Geophysical Observatory: Magnetic results, 1973
[ISBN-87-7478-130-8] N79-26606
Rude Skov Geophysical Observatory: Magnetic results, 1975
[ISBN-87-7478-149-9] N79-26607
Rude Skov Geophysical Observatory: Magnetic results, 1976
[ISBN-87-7478-150-2] N79-26608

DANISH RESEARCH CENTER FOR APPLIED ELECTRONICS, HOERSHOLM.
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 1: Non-military standards and national regulations. Survey of international and national standards and regulations on electrical interference and susceptibility
[ECR-79-PT-1] N79-26268
Standards and regulations on Electromagnetic Compatibility [EMC]. Part 2: Military and special industrial standards, regulations, and reccomendations international and national standards, regulations, and recommendations on electrical interference and susceptibility
[ECR-80-PT-2] N79-26269
Transient attenuation of power supplies: A theoretical and practical evaluation of a power supply's ability to prevent coupling of transient from mains network into the DC output
[ECR-83] N79-26334
Random vibration introduction: Environments, damaging effects, tests, test specifications and test economy
[ECR-84] N79-26435

DAYTON UNIV. RESEARCH INST., OHIO.
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment
N79-26719
Balloon-borne ECC ozonesonde data, appendix A
N79-26729

DEFENCE RESEARCH INFORMATION CENTRE, ORPINGTON [ENGLAND].
No more cadmium plating? Are there processes to replace it?
[DRIC-TRANS-5462] N79-26195

DELAWARE UNIV., NEWARK.
The direct phase cepstrum and its applications to ultrasonic testing
N79-26414
Proceedings of a Workshop on Coastal Sediment Transport Study
[PB-293632/6] N79-26757
Partially annotated tidal marsh bibliography. Second edition: Selected key work index
[PB-293466/9] N79-26760
On fractional replication of symmetrical factorial designs where the number of levels is not necessarily a prime or power of a prime
N79-26866

DENVER UNIV., COLO.
Note on non-destructive detection of voids by a high frequency inversion technique
[COO-2482-8] N79-26416
Preliminary results from the University of Denver infrared spectrometer - 1977 intertropical convergence zone experiment
N79-26724

DEPARTMENT OF AGRICULTURE, PHOENIX, ARIZ.
HCMM Heat Capacity Mapping Mission
[E79-10214] N79-26441

DEPARTMENT OF ENERGY, BARTLESVILLE, OKLA.
Performance characteristics of automotive engines in the United States. Third series: Report no. 2, 1978 Pontiac, 301 CID [4.9 liters], 2V
[PB-293772/0] N79-26411

DEPARTMENT OF ENERGY, WASHINGTON, D. C.
A method for correlating performance data of a terrestrial solar cell array
[NASA-TM-79163] N79-26503
Analytical methodology and facility description spent fuel policy
[DOE/ET-0054] N79-26917
Department of Energy policy for fusion energy
[DOE/ER-0018] N79-26952

DEUTSCHE FORSCHUNGS- UND VERSUCHSANSTALT FUER LUFT- UND RAUMFAHRT, OBERPFAFFENHOFEN [WEST GERMANY].
Simultaneous measurements from three motorgliders of temperature and humidity horizontal distribution in a cross-section of the Inn Valley east of Innsbruck under condition of mountain and valley winds circulation
N79-26677

DEUTSCHER WETTERDIENST, FREIBURG [WEST GERMANY].
Quantitative evaluation of the complex thermal effects on climatic therapy
N79-26651

DEUTSCHER WETTERDIENST, MUNICH [WEST GERMANY].
The GAFOR system of visual flight forecast for Alpine region
N79-26633

DEUTSCHER WETTERDIENST, NEUSTADT [WEST GERMANY].
Intensity of the lee-cyclogenesis over Northern Italy
N79-26629

DEUTSCHER WETTERDIENST, WEIHENSTEPHAN [WEST GERMANY].
Energy balance of an Alpine pasture, illustrated by an example for a day of the 1976 dryness period
N79-26687

DIRECTION DE LA METEOROLOGIE NATIONALE, PARIS [FRANCE].
Processing methodology for daily pluviometric data
[MN-MONO-102] N79-26619
Insolation duration, insolation quotient in France: 1951 - 1970
[MN-MONO-105] N79-26620
Climatology in French Polynesia
[MN-MONO-107] N79-26621
Foehn in Haute Tarentaise: A contribution to the study of a French Alpine Foehn
[MN-MONO-108] N79-26622
Situations causing late snowfall over the French Alps
N79-26703

DUKE UNIV., DURHAM, N. C.
Synthesis of silicon-nitrogen-phosphorus compounds including a new synthesis of phosphazenes
[AD-A067274] N79-26137
NMR of dilute ortho-H[sub]2 impurities in solid para-H[sub] 2 at temperatures below 1K
N79-26972

E

ECOLE POLYTECHNIQUE FEDERALE DE LAUSANNE [SWITZERLAND].
Remote measurement of the atmospheric parameters, using a radioacoustic sounder
N79-26625

EDGERTON, GERMESHAUSEN AND GRIER, INC., SALEM, MASS.
High voltage, low inductance hydrogen thyratron study program
[AD-A067178] N79-26319

EG AND G WASHINGTON ANALYTICAL SERVICES CENTER, RIVERDALE, MD.
Short-term solar pressure effect and GM uncertainty on TDRS orbital accuracy: A study of the interaction of modeling error with tracking and orbit determination
N79-26096

EG AND G WASHINGTON ANALYTICAL SERVICES CENTER, INC., ROCKVILLE, MD.
Air Deployed Oceanographic Mooring [ADOM]
[AD-A068001] N79-26755

EIDGENOESSISCHE ANSTALT FUER DAS FORSTLICHE VERSUCHSWESEN, BIRMENSDORF [SWITZERLAND].
Inorganic nitrogen content of precipitation in the lower Alps
N79-26696

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE, ZURICH [SWITZERLAND].
Lee side wind profiles during Foehn
N79-26644
A poster: Meteorological experiments in the framework of the 4th large-scale hail suppression test in Switzerland
N79-26707
Preliminary report on planning of the GARP mountain sub-program [ALPEX]
N79-26710

EIDGENOESSISCHES INSTITUT FUER SCHNEE- UND LAWINENFORSCHUNG, WEISSFLUHJOCH/DAVOS [SWITZERLAND].
Probability and productivity of important snowfalls in the mountains, particularly in the region of Davos
N79-26699

ELECTRICITE DE FRANCE, CHATOU.
Evolution of the properties and structure of 17Cr-13Ni-Mo very low carbon austenitic stainless steel during high temperature exposure
N79-26188
Comparison of different techniques for producing hydrogen: Production costs analysis
[P/51/76/14] N79-26240
Heat transfer mediums
[P-52/D-08/77-10] N79-26367
Geothermal heating with heat pumps
N79-26531
Analysis of helio-thermoelectrical energy conversion efficiency
[REPT-77/HP-40-241] N79-26534
Elements for technological and economic modeling of tower-type solar power plants
[P/51/76/17] N79-26535
Cost/benefit analysis of a solar power plant supplemented by diesel generation in comparison with a solely diesel system - optimizing for size and initial investment in an isolated area
[P/51/77/21] N79-26536
Study of low output solar energy power plants
[P/51/77/24] N79-26537

ELECTRICITE DE FRANCE, PARIS.
Thermoplastic materials: Water electrolysis
[P/539/77/06] N79-26152
Oxygen overvoltage on nickel and the 50-50 Ni-Fe alloy in 40% KOH at 80 C. Role of oxide films
[P/539/77/13] N79-26189
Nickel plating, volume 2
[P/539/77/28] N79-26190
Corrosion of nickel deposits in 40% KOH at 180 C, part 1
[P/539/77/31] N79-26191
Fe-Cr-Ni stainless steel corrosion in 40% KOH at 150 C and 180 C, part 2
[P/539/77/38] N79-26192
Pressurized water electrolysis test circuit: Initial operating results
[P/539/77/12] N79-26335
The use of fuel cell ion exchange membranes in electrolytic cells
[P/539/77/23] N79-26532
Hydrogen electrode and nickel boride alloys
[P/539/77/30] N79-26533

ELECTRONICS ENGINEERING GROUP [1842ND], SCOTT AFB, ILL.
AN/UYA-7 interface for USAF HF aeronautical stations
[AD-A067148] N79-26259

ENGINEERING SCIENCES DATA UNIT, LONDON [ENGLAND].
Single disc springs: Elastic deflections, stresses, stiffnesses and resiliences
[ESDU-78043] N79-26421

ENTE NAZIONAL PER L'ENERGIA ELETTRICA, MILAN [ITALY].
A micrometeorological network for study of transport and diffusion of pollutants in two Apennine Valleys
N79-26638

ENVIRONMENTAL MONITORING AND SUPPORT LAB., CINCINNATI, OHIO.
Distribution of phytoplankton in Arkansas lakes
[PB-292742/4] N79-26768

ENVIRONMENTAL MONITORING AND SUPPORT LAB., RESEARCH TRIANGLE PARK, N. C.
Stability evaluation of ambient concentrations of sulfur dioxide, nitric oxide, and nitrogen dioxide contained in compressed gas cylinders
[PB-292749/9] N79-26153
Air quality data for metals 1975 from the National Air Surveillance network
[PB-293106/1] N79-26570

ENVIRONMENTAL PROTECTION AGENCY, ANN ARBOR, MICH.
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 427 cubic inch 1977 California GMC 6500
[PB-293530/2] N79-26410
Exhaust emissions and fuel consumption of a heavy-duty gasoline powered vehicle over various driving cycles: 361 cubic inch 1966 Ford F-600
[PB-293529/4] N79-26567

ENVIRONMENTAL PROTECTION AGENCY, NEW YORK.
FEDBAK03: A computer program for the modeling of first order consecutive reactions with feedback under a steady state multidimensional natural aquatic system. Program documentation and user's guide
[PB-292760/6] N79-26553

ENVIRONMENTAL PROTECTION AGENCY, WASHINGTON, D. C.
Research summary--oil spills
[PB-293597/1] N79-26558
National Conference on Less Costly Wastewater Treatment Systems for Small Communities
[PB-293254/9] N79-27031

ENVIRONMENTAL RESEARCH INST. OF MICHIGAN, ANN ARBOR.
AID's remote sensing grant program
[PB-292872/9] N79-26456
SEMTAP: A new technology transfer network to link business and industry with Federal research and development
[PB-292882/8] N79-27026

ENVIRONMENTAL RESEARCH LAB., DULUTH, MINN.
Results of a joint USA/USSR hydrodynamic and transport modeling project
[PB-293516/1] N79-26467

ENVIRONMENTAL SCIENCES RESEARCH LAB., RESEARCH TRIANGLE PARK, N.C.
Oxidant formulation in the generation of ozone
[PB-293269/7] N79-26571
Hydrocarbons in Houston air
[PB-293226/7] N79-26579
Non-urban hydrocarbon concentrations in ambient air north of Houston, Texas
[PB-293227/5] N79-26580
Association between meteorological conditions and high ozone and sulfate concentrations: A 1974 episode in the Eastern United States
[PB-293485/9] N79-26611

ENVIRONMENTAL SYSTEMS CORP., KNOXVILLE, TENN.
Examination of specific aspects of cooling tower testing methodology
[EPRI-FP-953] N79-26545
ETABLISSEMENT D'ETUDES ET DE RECHERCHES METEOROLOGIQUES, ST. MARTIN D'HERES [FRANCE].
Statistical analysis of precipitations in the French Alps
N79-26693

F

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D. C.
Report of the FAA task force on aircraft separation assurance. Volume 1: Executive summary
[AD-A067905] N79-26042
Airport activity statistics of certificated route air carriers
[AD-A067924] N79-26074
FEDERAL ENERGY REGULATORY COMMISSION, WASHINGTON, D. C.
National gas survey: Synthesized gaseous hydrocarbon fuels
[DOE/FERC-0008] N79-26228
FERMI NATIONAL ACCELERATOR LAB., BATAVIA, ILL.
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898
FINNISH METEOROLOGICAL INST., HELSINKI.
Results from an attempt to interpolate temperature and wind profiles with respect to time with a one-dimensional boundary layer model
[TR-18] N79-26712
On the diurnal variation of visibility and fog in Finland
[TR-19] N79-26713
Acoustic radar and its use in meteorology
[TR-20] N79-26714
FLORENCE UNIV. [ITALY].
Landesman-Lazar type problems for nonlinear equations
N79-26856
On the boundary value problem u second derivative + u = 1/alpha u + p[t] u[0] = 0 = n [pi0
N79-26857
FLORIDA STATE UNIV., TALLAHASSEE.
Severe storms research
[PB-294129/2] N79-26749
Two concepts of positive dependence, with applications in multivariate analysis
[AD-A067545] N79-26848
Minimax subset selection for the multinomial and Poisson distributions
[AD-A067187] N79-26868
FLORIDA UNIV., GAINESVILLE.
Diffusion study in the Fe-Co-Ni-Au system using the penetration tendency approach
N79-26169
Multiparametric optimization of four-bar and six-bar linkages
N79-26238
Improvements in high injection transistor noise theory and models
N79-26299
Analysis of researchable water problems in the south Atlantic gulf region
[PB-293484/2] N79-26458
The prime discriminant factorization of discriminants of algebraic number fields
N79-26836
FLOW RESEARCH, INC., KENT, WASH.
Turbulent flow past a self-propelled vehicle. 2: Computation
[AD-A067795] N79-26364
FLUOR ENGINEERS AND CONSTRUCTORS, INC., IRVINE, CALIF.
Coal liquefaction test center
[FE-1517-67] N79-26226
FONDAZIONE UGO BORDONI, ROME [ITALY].
The use of rhymed polysyllabic words in studying aural intelligibility indoors
[FUB-30-1977] N79-26270
Output capacity of the stored program control [SPC] commutation system
[FUB-35-1977] N79-26271
Video telephonic service: Study on the influence of microphone characteristics and band width on intelligibility and quality of audio signals
[FUB-36-1977] N79-26272
Quasi-optical elbows in circular waveguide connections
[FUB-39-1977] N79-26273
Description of main methodologies used for speaker recognition
[FUB-1-1978] N79-26274
Report on collaboration activity between the 'Istituto Superiore Poste e Telecomunicazioni' and the Ugo Bordoni Foundation in 1977
N79-26275
Determination of the statistical properties of the digital sum of line codes to evaluate the relative average increase in error probability due to low frequency distortion in data transmission
[FUB-3-1978] N79-26281
A method for the formal description of signaling systems
[FUB-4-1978] N79-26282
Considerations about 2.6/9.5 coaxial cable characterization related to high capacity digital systems carrier utilization
[FUB-7-1978] N79-26283
Control procedures in block commutation networks, part I
[FUB-8-1978] N79-26284
Automatic speaker recognition: Considerations on an adequate methodology to solve the problem
[FUB-10-1978] N79-26285
Error rate estimation method based on the detection of line coding violations
[FUB-11-1978] N79-26286
Subjective speaker recognition: Statistical consideration on attainable results significance
[FUB-17-1978] N79-26287
Comments on repeater distance dimensioning in coaxial cable digital data transmission
[FUB-26-1977] N79-26337
Analysis of a model for the interpretation of chromatic delay in light emitting diodes
[FUB-31-1977] N79-26338
Computation of the equilibrium points in an electric network with many machines
[FUB-2-1978] N79-26340
Italian noise legislation: Defects and insufficiencies of present situation
[FUB-18-1978] N79-26550
Relationship between raingauge tipping volume and rain rate distributions
[FUB-32-1977] N79-26739
Simulation of an information system with a distributed architecture
[FUB-34-1977] N79-26819
The use of simulation languages for studying digital direct control systems
[FUB-5-1978] N79-26821
Functions of a particular class of singular matrices
[FUB-12-1977] N79-26858
Criteria for the dimensioning of numerical multiplexing frames
[FUB-27-1977] N79-26859
Design method for the layout of quasi optical elbows in a connection with circular wave guides
[FUB-6-1978] N79-26934
Characterization of optical fibers and design criteria of communication systems
[FUB-14-1978] N79-26935
Radiation effects on optical fibers
[FUB-16-1978] N79-26936
FOREST PRODUCTS LAB., MADISON, WIS.
A information retrieval system for research file data
[AD-A068021] N79-27017
FOREST SERVICE, WASHINGTON, D. C.
Lake Champlain basin forestland as a source of non-point pollutants
[PB-293434/7] N79-26460
FORSCHUNGSINSTITUT FUER ANTHROPOTECHNIK, MECKENHEIM [WEST GERMANY].
Analytical methods for biotechnological design of man machine systems: Work on system ergonomy
[FB-28] N79-26787
FORSCHUNGSINSTITUT FUER HOCHFREQUENZPHYSIK, WERTHHOVEN [WEST GERMANY].
A fast method for determining the mean orbital elements of an earth satellite
[REPT-3-78] N79-26099

G

GCA CORP., BEDFORD, MASS.
Preliminary environmental assessment of the lignite-fired CAFB
[PB-293225/9] N79-26569
GENERAL ATOMIC CO., SAN DIEGO, CALIF.
Angular effects in the sputtering of stainless steel by hydrogen ions
[GA-A-15124] N79-26185
Nuclear closed-cycle gas turbine [GT-HTGR]: A utility power plant for the year 2000
[GA-A-15184] N79-26515
Doublet demonstration fusion power reactor study
[GA-A-14742] N79-26946
GENERAL ELECTRIC CO., CINCINNATI, OHIO.
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 1
[NASA-CR-159575-VOL-1] N79-26884
Acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 2
[NASA-CR-159575-VOL-2] N79-26885
acoustic and aerodynamic performance investigation of inverted velocity profile coannular plug nozzles, comprehensive data report, volume 3
[NASA-CR-159575-VOL-3] N79-26886
GENERAL ELECTRIC CO., EVENDALE, OHIO.
Experimental clean combustor program: Diesel no. 2 fuel addendum, phase 3
[NASA-CR-135413] N79-26221
GENERAL ELECTRIC CO., PHILADELPHIA, PA.
Real-time onboard geometric image correction
N79-26084
An investigation of the adhesive bonding of Teflon solar cell covers
[NASA-CR-159565] N79-26506
GENERAL ELECTRIC CO., SANTA BARBARA, CALIF.
Compendium reports on oil shale technology
[PB-293279/6] N79-26237
WEDCOM 4: A FORTRAN code for the calculation of ELF, VLF, and LF propagation in a nuclear environment. Volume 3: Computational models
[AD-A066977] N79-26260
GENERAL ELECTRIC CO., SYRACUSE, N.Y.
An iterative interpolation technique using finite impulse response digital filters
[AD-A067511] N79-26322
GENEVA UNIV. [SWITZERLAND].
Paleoclimate of the Nendaz region. New interpretation of the post-wurmian warming
N79-26657
GENOA UNIV. [ITALY].
The precipitation in the period from 6-10 October 1977 over the Central Liguria
N79-26694
Geographical distribution of ice formation in Liguria
N79-26701
GEOLOGICAL SURVEY, BAY SAINT LOUIS, MISS.
Distributed routing rainfall-runoff model
[PB-292303/5] N79-26451
GEOLOGICAL SURVEY, INDIANAPOLIS, IND.
Water resources data for Indiana, water year 1977
[PB-292256/5] N79-26450
GEOLOGICAL SURVEY, LAKEWOOD, COLO.
Present and potential sediment yields in the Yampa River Basin, Colorado and Wyoming
[PB-292677/2] N79-26455
GEOLOGICAL SURVEY, MENLO PARK, CALIF.
On the development of strong-motion instrument networks in the United States
[PB-293579/9] N79-26612
GEOPHYSIKALISCHE BERATUNGSTELLE, MEMMINGEN [WEST GERMANY].
Visual weather conditions for flight over the Alps
N79-26632
GEORGE WASHINGTON UNIV., WASHINGTON, D. C.
Study of a density cell to measure suspended load
[PB-292954/5] N79-26452
GEORGETOWN UNIV., WASHINGTON, D.C.
Thermodynamic studies of ternary mixtures by gas-liquid chromatography
N79-26124
GEORGIA INST. OF TECH., ATLANTA.
A method of computing the pressure distribution on a single-bladed hovering helicopter rotor
N79-26044
Millimeter wave satellite concepts. Volume 1: Executive summary
[NASA-CR-159504] N79-26101
Millimeter wave satellite concepts. Volume 2: Technical report
[NASA-CR-159503] N79-26102
Laboratory study of pyrolysis of explosive contaminated waste
[AD-A066973] N79-26222
Analyses of reframing performance of multilevel synchronous time division multiplex hierarchy
N79-26247
A longitudinal coupling mechanism in multi-pair cable crosstalk
N79-26249
Propagation of noise in the far field from electric transformers
N79-26293
An evaluation of nozzle response to transient disturbances
N79-26355
Angular addressing properties of volume Fourier transform holograms in iron-doped lithium niobate
N79-26371
Combustion noise prediction: Entropy/vorticity effects
[AD-A067993] N79-26882
Frequency-variant optical signal processing
N79-26928
GEORGIA UNIV., ATHENS.
Experimental studies of coherent anti-Stokes Raman spectroscopy in liquids
N79-26123
A study of the effects of error of measurement on multiple regression analysis and a comparison of possible correction techniques
N79-26840

Band and polarization calculations for ferro-electric and piezoelectric crystals
N79-26964

GESELLSCHAFT FUER STRAHLEN- UND UMWELTFORSCHUNG M.B.H., MUNICH (WEST GERMANY).
Spatial and temporal variations of the isotopic composition of precipitations at the Alps periphery
N79-26695

GILBERT ASSOCIATES, INC., READING, PA.
Typical costs for electric energy generation and environmental controls
(PB-293502/1) N79-26577

GOLDER ASSOCIATES, INC., KIRKLAND, WASH.
Information base for waste repository design. Volume 5: Decommissioning of underground facilities
(PB-293405/7) N79-26904
Scoping study of salt domes, basalts and crystalline rock as related to long term risk modeling for deep geologic disposal of nuclear waste
(UCRL-13945) N79-26907
Information base for waste repository design. Volume 1: Borehole and shaft sealing
(PB-293401/6) N79-26922
Information base for waste repository design. Volume 2: Equipment performance requirements
(PB-293402/4) N79-26923
Information base for waste repository design. Volume 3: Waste/rock interactions
(PB-293403/2) N79-26924
Information base for waste repository design. Volume 4: Mine structural features
(PB-293404/0) N79-26925
Information base for waste repository design. Volume 6: Excavation technology
(PB-293406/5) N79-26926
Information base for waste repository design. Volume 7: Executive summary
(PB-293407/3) N79-26927

GORAKHPUR UNIV. (INDIA).
Approximate tests of hypotheses in regression models with grouped data
(AD-A066926) N79-26845

H

HAMBURG UNIV. (WEST GERMANY).
Spectral presentation of errors of numerical weather forecast
N79-26669

HANFORD ENGINEERING DEVELOPMENT LAB., RICHLAND, WASH.
Dynamic analysis to establish normal shock and vibration of radioactive material shipping packages
(PB-293660/7) N79-26409
Varied applications of a new maximum-likelihood code with complete covariance capability
(HEDL-SA-1616-FP) N79-26818

HARRIS CORP., MELBOURNE, FLA.
Scanner development
(AD-A066902) N79-26390

HARRY DIAMOND LABS., ADELPHI, MD.
Energy levels and line intensities for the ground configuration of Pr3+ in LiYF4
(AD-A067845) N79-26140
Design of VHF and UHF communications air/ground antennas
(AD-A067307) N79-26254
Neutron damage correlation experiments in semiconductor devices
(AD-A066886) N79-26987

HARVARD COLL. OBSERVATORY, CAMBRIDGE, MASS.
AE reaction rate data
(AD-A067941) N79-26593

HAWAII UNIV., HONOLULU.
A study of the acousto-optic effect in nematics as a means of acoustic field imaging
(AD-A067173) N79-26986

HELSINKI UNIV. OF TECHNOLOGY, ESPOO (FINLAND).
On the existence of solutions of nonlinear Volterra equations in abstract spaces
(HTKK-MAT-A120/1978) N79-26855

HOHENHEIM UNIV., STUTTGART (WEST GERMANY).
Time variations of sunshine and sun radiation in the eastern Alps region?
N79-26682

HONEYWELL, INC., ST. PETERSBURG, FLA.
Navigation and attitude reference for autonomous satellite launch and orbital operations
N79-26089

HOUSTON UNIV., TEX.
An approach to biased estimation in regression analysis
N79-26839
Computer-aided investigation of reaction path synthesis
N79-26891

HUGHES AIRCRAFT CO., CULVER CITY, CALIF.
Electrical characterization of standard and radiation-hardened RCA CDP1856D 4-BIT, CMOS, bus buffer/separator
(NASA-CR-158725) N79-26314
Electrical characterization of Hughes HCMP 1853D and RCA CDP1853D N-bit, CMOS, 1-of-8 decoder microcircuits
(HAC-REF-E0963) N79-26315

HUGHES RESEARCH LABS., MALIBU, CALIF.
Correction of phase distortion by nonlinear optical techniques
(AD-A066148) N79-26386
Blue-green filter technology
(AD-A067789) N79-26931
Advanced multidither coat studies
(AD-A068005) N79-26932

HUMAN ENGINEERING LABS., ABERDEEN PROVING GROUND, MD.
A photometric and legibility assessment of Aerospace Optics, Incorporated Vivisun 20/20 display
(AD-A067668) N79-26786

HYDROMETEOROLOGICAL INST. OF THE SOCIALIST REPUBLIC OF CROATIA, ZAGREB (YUGOSLAVIA).
Temperature and cloudiness correlation in the region of Alps
N79-26661
The effect of vertical resolution in a limited area atmospheric model
N79-26665
A contribution to the problem of parametrization of convection clouds in connection with macroscale circulation
N79-26668
Objective cross section analysis
N79-26674
A case study of frontal developments in the Alps region
N79-26675
Air temperature and heat energy balance in Dinaric Alps
N79-26681

HYDROTRONICS, INC., SAN DIEGO, CALIF.
A determination of the first two moments of the ale output detector
(AD-A067213) N79-26320
Experimental performance measurements of Adaptive Noise Canceller (ANC): Various inputs and internal parameters correspond with existing theory
(AD-A067977) N79-26325

I

IDAHO NATIONAL ENGINEERING LAB., IDAHO FALLS.
Steam generator component studies with RELAP4/MOD6
(CVAP-TR-78-019) N79-26526

IIT RESEARCH INST., CHICAGO, ILL.
Evaluation of the effects of solar radiation on glass
(NASA-CR-161247) N79-26209

ILLINOIS DEPT. OF REGISTRATION AND EDUCATION, SPRINGFIELD.
Record winter storms in Illinois, 1977 - 1978
(PB-293181/4) N79-26752

ILLINOIS INST. OF NATURAL RESOURCES, SPRINGFIELD.
The new residence 1977 solar house design competition
(PB-293069/1) N79-26540

ILLINOIS INST. OF TECH., CHICAGO.
Characterization and effects of molecular orientation in amorphous polymers
N79-26204
Simultaneous realization of input and transfer impedances in RC ladder networks
N79-26308
Adaptive delta modulation: Digital filtering and the effects of random channel errors
N79-26310
Fluid mechanics of horizontal and vertical laminar Newtonian jets
N79-26347

ILLINOIS STATE DEPT. OF TRANSPORTATION, SPRINGFIELD.
Continuously reinforced concrete overlays on existing Portland cement concrete pavements
(PB 293043/6) N79-26242

ILLINOIS STATE WATER SURVEY, URBANA.
Record winter storms in Illinois, 1977 - 1978
(PB-293181/4) N79-26752

ILLINOIS UNIV. AT URBANA-CHAMPAIGN.
Steady state and stability characteristics of catalytic arrays
N79-26129
A study of the experimental implementation and the resulting characteristic behavior of the J-integral fracture toughness parameter applied to two controlled-rolled steels
N79-26170
A singular perturbation approach to power system dynamics
N79-26294
A dynamic crossed-field photomultiplier with an electron bombarded semiconductor collector
N79-26307
Source excitation of an open, parallel-plate waveguide. Numerical results
(AD-A067787) N79-26323
Inertial perturbations to inertialess magnetohydrodynamic and rotating flows
N79-26342
Study of second order turbulence models with variable coefficients
N79-26351
Experimental measurements of the behavior of non dilute particle suspensions in turbulent flow
N79-26353
Droplet mixing and deposition in a turbulent flow
N79-26356
An experimental heat transfer study of the straight portion of the exhaust port of a spark ignition engine
N79-26400
Concentrated force problems in transverse isotropy
N79-26420
Some new results in the second-order theory of nonlinear thermoelasticity
N79-26426
A stochastic model for an intermittent hydrologic process
N79-26438
Intelligent magnetic bubble memories
N79-26788
An implementation of a system for the formal definition of programming languages
N79-26804
Sensitivity analysis for heuristic algorithms
N79-26805
A multiprocessing system for the direct execution of LISP
N79-26809
Adaptive allocation of decision making responsibility between human and computer in multitask situations
N79-26827
The least-squares estimation of latent trait variables by a Hilbert space approach
(AD-A067279) N79-26847
Estimation for uncertain linear systems with jump parameters
N79-26874
Harmonic generation and parametric excitation in a beam-plasma system
N79-26938
Effects of suprathermal fusion particles in Tokamak plasmas
N79-26939
Thin-source concentration dependent diffusion
N79-26966
Superlattice formation in group 4-B transition metal dichalcogenides
N79-26971
Studies of high-dose ion implantation in silicon
N79-26975
Some non-perturbative results in relativistic field theory
N79-26995
A chemical theory for the thermodynamics of highly solvated liquid metal mixtures
N79-26996

ILLINOIS UNIV. AT URBANA-CHAMPAIGN, URBANA.
The decomposition of polycyclic organic matter adsorbed on coal fly ash
N79-26119
Fluorescence measurements on a minidisc centrifugal analyzer with a pulsed nitrogen laser source
N79-26125
Accurate chemical characterization by fluorescence spectrometry
N79-26126
The properties of indium gallium antimonide thin films deposited by multitarget rf sputtering
N79-26155
A study of metal-oxygen solid solutions utilizing solid electrolytic cells
N79-26160
Coding for the control of intersymbol interference in baseband channels
N79-26248
Development of linear and nonlinear magnetic circuit models for the prediction of step motor static performance
N79-26297
Atomic and electrical profile studies of ion-implanted semiconductors
N79-26303
Unsteady turbulent thermal convection
N79-26344
An investigation of the atomic fluorine laser excited in a hollow cathode discharge
N79-26383
Proximity and reachability in the plane
N79-26838

Identification of parameters in distributed systems using finite element method
N79-26842
Multimodeling and multiparameter singular perturbation in control and game theory
N79-26873
Bloch functions in several complex variables
N79-26876
Hadron production in high energy muon scattering
N79-26903
Upper critical magnetic field of superconducting films with magnetic impurities
N79-26962
Catalysis by transition metal compounds
N79-26963
Ultrasonic studies of radiation damage in an aluminum-manganese alloy
N79-26965
Surface studies of group IV-VI layered crystals
N79-26967
Specific heat of superconducting films of indium and of indium alloyed with magnetic impurities
N79-26968
Crystal growth and electrical properties of sputtered indium gallium antimonide thin films
N79-26974
The solution of two dimensional problems in astrophysics
N79-27047

ILLINOIS UNIV., URBANA.
Rocket radio measurement of electron density in the nighttime ionosphere
[NASA-CR-157442] N79-26587
Day-to-day variations or atmospheric tides as observed by meteor radar
[UILU-ENG-79-2506] N79-26588
Software systems research
[COO-2383-51] N79-26817
Alpha heating in toroidal devices
[COO-2218-123] N79-26957

IMPERIAL COLL. OF SCIENCE AND TECHNOLOGY, LONDON [ENGLAND].
Research programme on turbulent shear layers
[IC-AERO-78-105] N79-26032

INDIAN INST. OF SCIENCE, BANGALORE.
A low-cost water pumping windmill using a sail type Savonius rotor
[PB-294413/0] N79-26541

INDUSTRIAL ENVIRONMENTAL RESEARCH LAB., RESEARCH TRIANGLE PARK, N. C.
Characterization of the EPA/IERL-RTP pilot-scale precipitation
[PB-292820/8] N79-26555

INNSBRUCK UNIV. [AUSTRIA].
Study of water drainage from columns of snow
[AD-A066935] N79-26590
Synoptic analysis of an Alpine weather map
N79-26631
South Foehn, north Foehn, and temperature peaks at Innsbruck and Bozen
N79-26678
Radiation balance at 2 high-altitude Alpine stations during the vegetation period
N79-26686
Investigation of water table on the Kesselwandferner [Oetztal Alps] in a 30 m deep firn pit, a synopsis
N79-26690

INSTITUT D'AERONOMIE SPATIALE DE BELGIQUE, BRUSSELS.
Space Activities in 1977
N79-27063

INSTITUT ROYAL METEOROLOGIQUE DE BELGIQUE, BRUSSELS.
The effect of ground relief upon the extreme values of intensity and duration of precipitation in Belgium. Methods and results
N79-26697

INSTITUTE FOR METEOROLOGY AND WATER ECONOMY, CRACOW [POLAND].
The changes of the atmospheric circulation indices over the Polish West Carpathians during the last 27 years
N79-26627

INSTITUTE OF GAS TECHNOLOGY, CHICAGO, ILL.
Development of combustion data to utilize low-Btu gases as industrial process fuels
[FE-2489-30] N79-26143
Process design for coal conversion reactors
[CONF-781110-15] N79-26232

INSTITUTE OF METEOROLOGY AND HYDROLOGY, BUCHAREST [RUMANIA].
The experimentation of a baroclinic model with 5 levels in the south-eastern Europe, including the orography effect
N79-26663
Modifications of the surface frontogenesis, associated with simple orography in an isentropic model
N79-26666
The analysis of the influence of the Romanian Carpathians upon wind forecasting in Romania
N79-26673
Ice depositions in Rumanian mountainous regions
N79-26704
An objective analysis of the climatological parameters of thunderstorm activity over the Rumanian Carpathians
N79-26705

INTERNATIONAL BANK FOR RECONSTRUCTION AND DEVELOPMENT, WASHINGTON, D.C.
Wind driven water pumps. Economics, technology, current activities
[PB-292816/6] N79-26542

INTERNATIONAL METEOROLOGICAL INST., STOCKHOLM [SWEDEN].
The IMI network in Sweden: Present equipment, methods, and plans for improvement
[AC-40] N79-26740

INTERUNIVERSITAIR REACTOR INSTITUUT, DELFT [NETHERLANDS].
Cu-content of the liver of young mice in relation to a defect in the Cu-metabolism
[IRI-133-77-02] N79-26764
Results of a 64Cu-loading test applied to patients with an inherited defect in their Cu-metabolism [Menkes' disease]
[IRI-133-77-04] N79-26774
The oral 64Cu-loading test: Applications and problems
[IRI-133-78-02] N79-26775

IOWA STATE UNIV. OF SCIENCE AND TECHNOLOGY, AMES.
The influence of compressor inlet guide vane/stator relative circumferential positioning on blade wake transport and interaction
[AD-A067969] N79-26060

IOWA UNIV., IOWA CITY.
Three-dimensional boundary layers on bodies of revolution at incidence
N79-26350
An analytical solution of the thick axisymmetric turbulent boundary layer on a long cylinder of constant radius
N79-26352
Dynamic analysis and design sensitivity analysis of mechanisms with intermittent motion
N79-26399
Regional geologic analysis of the Black Hills of South Dakota and Wyoming from remote sensing data
N79-26437
High angular resolution observations of the circumstellar OH masers surrounding supergiant stars
N79-27042

ISTITUTO SUPERIORE DI SANITA, ROME [ITALY].
Radiation safety in the use of color television sets
[ISS-T-77/4] N79-26276
Decision problems in multistatic sonar systems
[ISS-R-78/4] N79-26889
Validity of the factorized DWIA in e, e1p reactions
[ISS-P-78/8] N79-26899
Realistic interactions and variational calculations of the ground state properties of three body systems on a harmonic oscillator basis
[ISS-P-78/10] N79-26900
Electrodisintegration of few-body systems and realistic interactions
[ISS-P-78/11] N79-26901
A preliminary study on the dosimetric properties of CaSO4: Dyribbon [TLD-900]
[ISS-P-78/14] N79-26902
Future requirements and present perspectives in data handling for high energy physics experiments
[ISS-T-78/5] N79-26920
Information on nucleon-nucleon interaction from nuclear matter calculations
[ISS-P-78/12] N79-26921

J

JAGELLONIAN UNIV., CRACOW [POLAND].
Characterizing thermal conditions in mountainous regions from the standpoint of requirements for cultivated plant growth
N79-26652
Global solar radiation in a vertical profile of the Carpathians
N79-26685

JET PROPULSION LAB., CALIF. INST. OF TECH., PASADENA.
Echo tracker/range finder for radars and sonars
[NASA-CASE-NPO-14361-1] N79-26253
Low current linearization of magnetic amplifier for dc transformer
[NASA-CASE-NPO-14617-1] N79-26311
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
Electrical characterization of standard and radiation-hardened RCA CDP1856D 4-BIT, CMOS, bus buffer/separator
[NASA-CR-158725] N79-26314
Electrical characterization of Hughes HCMP 1853D and RCA CDP1853D N-bit, CMOS, 1-of-8 decoder microcircuits
[HAC-REF-E0963] N79-26315

Automotive fuel economy and emissions experimental data
[PB-293580/7] N79-26412
Measurement techniques and instruments suitable for life-prediction testing of photovoltaic arrays
[NASA-CR-158733] N79-26486
Process feasibility study in support of silicon material, task 1
[NASA-CR-158726] N79-26487
Array automated assembly task for the low cost solar array project, phase 2
[NASA-CR-158727] N79-26489
Continuous Czochralski growth. Silicon sheet growth development of the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158730] N79-26496
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-158723] N79-26497
Array automated assembly, phase 2
[NASA-CR-158728] N79-26498
Large area silicon sheet by EFG
[NASA-CR-158731] N79-26501
Study of modeling and evaluation of remote manipulation tasks with force feedback
[NASA-CR-158721] N79-26785
Slicing of silicon into sheet material: Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158732] N79-26979
Silicon ingot casting, heat exchanger method multiwire slicing, fixed abrasive slicing technique. Phase 3: Silicon sheet growth development for the large area sheet task of the low-cost solar array project
[NASA-CR-158734] N79-26981

JOHNSON [E. R.] ASSOCIATES, INC., VIENNA, VA.
Alternative waste management options, Nuclear Fuel Services, Inc., high level waste
[ANL-K-78-4190-2] N79-26908

JOINT PUBLICATIONS RESEARCH SERVICE, ARLINGTON, VA.
Translations on USSR science and technology: Physical sciences and technology, no. 72
[JPRS-73663] N79-27064
Integrated systems: A modern trend in the development of automated design systems
N79-27065
Principles of the construction of a new generation of SAPR's
N79-27066
Relief of the Ocean floor and the new global tectonics
N79-27067

K

KANSAS STATE GEOLOGICAL SURVEY, LAWRENCE.
A summary of the regional tectonics and seismicity of eastern Kansas; summary of project activities and results to the end of the second year, or September 10, 1979
[PB-293661/5] N79-26610

KANSAS UNIV. CENTER FOR RESEARCH, INC., LAWRENCE.
Comparison of theoretical predicted longitudinal aerodynamic characteristics with full-scale wind tunnel data on the ATLIT airplane
[NASA-CR-158753] N79-26018

KANSAS WATER RESOURCES RESEARCH INST., MANHATTAN.
Improvement of the steady floating random walk Monte Carlo method near straight line and circular boundaries with application to groundwater flow
[PB-292560/0] N79-26453
Kansas River Limnology: Seasonal variations in photosynthetic production and heavy metal accumulation by aquatic insects
[PB-293604/5] N79-26578

KARLSRUHE UNIV. [WEST GERMANY].
Numerical simulation of river icing, depending on meteorological parameters, using the Loisach in upper Bavaria as an example
N79-26709

KAWASAKI STEEL CORP., TOKYO [JAPAN].
Heavy plate of quenched and tempered steel with 80kg/mm2 tensile strength
[PB-292929/7] N79-26199

KAYEX CORP., ROCHESTER, N. Y.
Continuous Czochralski growth. Silicon sheet growth development of the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158730] N79-26496

KENT STATE UNIV., OHIO.
Evaluation of aluminum sulfate for phosphorus control in eutrophic lakes
[PB-292989/1] N79-26556

KENTUCKY UNIV., LEXINGTON.
Extrapolation of induced transient surface currents on a scatterer to general band limited excitation conditions
[AD-A067672] N79-26265

A Kentucky energy resource utilization program
[PB-292949/5] N79-26538
KIRUNA GEOPHYSICAL INST. [SWEDEN].
SNR for the EISCAT UHF system
[KWI-78-1] N79-26266
Expected muon spectra at two different latitudes
[KGI-77-2] N79-27058

L

L N K CORP., INC., SILVER SPRING, MD.
The use of models in image analysis
[AD-A067166] N79-26448
LABORATOIRE CENTRAL DE RECHERCHES THOMSON-CSF, ORSAY [FRANCE].
Integrated millimeter waves generator
[LCR-489-315] N79-26336
Low frequency phenomena in smectic A liquid crystals
N79-26993
LABORATORIO DI RICERCA E TECHNOLOGIA PER LO STUDIO DEL PLASMA NELLO SPAZIO, FRASCATI [ITALY].
Averaging filter for analog processing of gravitational signals
[LPS-78-10] N79-26280
The dc magnetic field observations at the earth's bow shock
[LPS-78-5] N79-27050
Magnetic dips in the solar wind
[NASA-TM-80477] N79-27053
LAKE CHAMPLAIN BASIN STUDY, BURLINGTON, VT.
Estimates of the annual loading of total phosphorus to Lake Champlain
[PB-293435/4] N79-26459
Lake Champlain basin forestland as a source of nonpoint pollutants
[PB-293434/7] N79-26460
Lands in transition: Lake Champlain shoreland changes, 1960 - 1990
[PB-293431/3] N79-26461
A Lake Champlain trophic classification system
[PB-293427/1] N79-26462
Lake Champlain islands report
[PB-293441/2] N79-26463
Suitability of input-output models for evaluating the impact of phosphorous loadings to Lake Champlain
[PB-293442/0] N79-26464
Erosion and sedimentation nonpoint pollution sources and controls, LaPlatte River watershed
[PB-293436/2] N79-26576
LAMAR UNIV., BEAUMONT, TEX.
Process feasibility study in support of silicon material, task 1
[NASA-CR-158726] N79-26487
LEEDS AND NORTHRUP CO., NORTH WALES, PA.
Optical instrument for in-stack monitoring of particle size
[PB-292751/5] N79-26561
LEHIGH UNIV., BETHLEHEM, PA.
Evaluation of surface properties in SPAR electrophoresis
[NASA-CR-161248] N79-26136
Structuring of data systems: Psychophysiological data from the dynamic flight simulator
[AD-A067175] N79-27014
LIFE SYSTEMS, INC., CLEVELAND, OHIO.
Technology advancement of the electrochemical CO2 concentrating process
[NASA-CR-152250] N79-26135
LINCOLN LAB., MASS. INST. OF TECH., LEXINGTON.
Uplink ATCRBS environment measurements along the Boston-Washington corridor. Volume 2: Interrogator characteristics
[AD-A067944] N79-26041
A Gaussian noise analysis of the pseudo-coherent discriminant
[AD-A067103] N79-26258
Heat and mass flow analysis of packed-bed thermal regenerators
[CAES-9] N79-26523
Combined photovoltaic and thermal hybrid collector systems
[COO-4577-3] N79-26525
GaInAs and GaInAsP MBE crystal growth
[AD-A067164] N79-26985
LITTLE [ARTHUR D.], INC., CAMBRIDGE, MASS.
Measurement of PCB emissions from combustion sources
[PB-293360/4] N79-26154
LJUBLJANA UNIV. [YUGOSLAVIA].
Time and space variability of sunshine duration in mesoscale
N79-26684
LOCKHEED-CALIFORNIA CO., BURBANK.
Icing tests of a UH-1H helicopter with an electrothermal ice protection system under simulated and natural icing conditions
[AD-A067737] N79-26050
LOCKHEED ELECTRONICS CO., HOUSTON, TEX.
Summary of NASA aircraft [NC-130] data collected for the Agricultural Soil Moisture Experiment [ASME] during 1978
[E79-10215] N79-26442
A simulation study of Large Area Crop Inventory Experiment [LACIE] technology
[E79-10216] N79-26443
Ten-Ecosystem Study [TES] site 9, Washington County, Missouri
[E79-10218] N79-26445
Large Area Crop Inventory Experiment [LACIE]. Signature extension in remote sensing
[E79-10219] N79-26446
LOCKHEED MISSILES AND SPACE CO., HUNTSVILLE, ALA.
Investigation of a laser Doppler velocimeter system to measure the flow field around a large scale V/STOL aircraft in ground effect
[NASA-CR-152212] N79-26374
LOCKHEED MISSILES AND SPACE CO., SUNNYVALE, CALIF.
The development of a microwave radiometer for use as a highway ice detector
[PB-292645/9] N79-26382
LOCKMAN AND ASSOCIATES, MONTEREY PARK, CALIF.
Recovery, processing, and utilization of gas from sanitary landfills
[PB-293165/7] N79-26235
LOGISTICS MANAGEMENT INST., WASHINGTON, D. C.
FINCAP analysis: A method for financial capability analysis of Air Force contractors
[AD-A067998] N79-27006
LOS ALAMOS SCIENTIFIC LAB., N. MEX.
Initiation and propagation of normal zones in a force-cooled tubular superconductor
[LA-UR-78-2481] N79-26331
Ultraviolet damage resistance of laser coatings
[LA-UR-78-2607] N79-26396
Plated copper substrates for the LASL Antares CO2 laser system
[LA-UR-79-9] N79-26397
Vibration isolation measurements on a precision machine tool
[LA-UR-78-3252] N79-26404
General-purpose heat source project, space nuclear safety program, and radioisotopic terrestrial safety program
[LA-7651-PR] N79-26910
Materials problems with inertial confinement fusion targets
[LA-UR-79-76] N79-26945
LOUGHBOROUGH UNIV. OF TECHNOLOGY [ENGLAND].
A consideration of general aviation in the UK
[TT-7902] N79-26010
Development of a test facility for investigating the relations between noise and inflow disturbance in an aircraft propulsion fan
[TT-7805] N79-26066
LOUISIANA STATE UNIV., BATON ROUGE.
Development of a research plan for the improvement of aerodynamic models for analysis of ballistic range data
[AD-A067950] N79-26029
LOW ENERGY TRANSPORT SYSTEMS, CAPISTRANO BEACH, CALIF.
Summary of past experience in natural laminar flow and experimental program for resilient leading edge
[NASA-CR-152276] N79-26024

M

M&S COMPUTING, INC., HUNTSVILLE, ALA.
Inertial Upper Stage [IUS] software analysis
[NASA-CR-161251] N79-26107
CAT information display system users manual
[NASA-CR-161243] N79-26711
MARIE CURIE-SKLODOWSKA UNIV., LUBLIN [POLAND].
Peculiar humidity-thermal conditions in a carpathian mountain valley in relation to different weather types
N79-26679
MARTIN MARIETTA AEROSPACE, ORLANDO, FLA.
High altitude altimeter flight test
[AD-A066904] N79-26054
MARTIN MARIETTA CORP., DENVER, COLO.
An impedance technique for determining low-frequency payload environments
[NASA-CR-3143] N79-26428
MARTIN MARIETTA LABS., BALTIMORE, MD.
Photochemistry and enzymology of photosynthesis
[COO-3326-70] N79-26763
MARYLAND STATE HIGHWAY ADMINISTRATION, BROOKLANDVILLE.
Performance study of continuously reinforced concrete pavement on I-95
[PB-292930/5] N79-26241
MARYLAND UNIV., COLLEGE PARK.
A study of the drooped leading edge airfoil
[NASA-CR-158717] N79-26013
Analysis of flat mirror V-trough solar concentrator
N79-26472
MASSACHUSETTS INST. OF TECH., CAMBRIDGE.
A wind-tunnel investigation of tilt-rotor gust alleviation systems
[NASA-CR-152264] N79-26062
Some effects of vehicle flow field on the capture efficiency of a Gerdien capacitor atmospheric probe
[AD-A067710] N79-26594
Stochastic and adaptive systems
[AD-A067598] N79-26830
Linear state feedback, quadratic weights, and closed loop eigenstructures
[NASA-CR-158755] N79-26844
A comparison of heuristic methods used in hierarchical production planning
[AD-A066932] N79-27004
MASSACHUSETTS UNIV., AMHERST.
Scattering studies from polymer blends
N79-26202
Flame retardation of polymers
N79-26205
The preparation and characterization of elastomers containing pendent sulfonic acid derivatives
N79-26206
Structural dynamics, stability and control of high aspect ratio wind turbine generators
N79-26471
On linear differential systems having separable exponential form solutions with application to the calculation of transition matrices
N79-26879
A study of the pulsar in a binary system
N79-27039
MATERIALS RESEARCH, INC., CENTERVILLE, UTAH.
Quantitative analysis of defects in silicon. Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158738] N79-26492
Quantitative analysis of defects in silicon: Silicon sheet growth development for the large area silicon sheet task of the low-cost solar array project
[NASA-CR-158724] N79-26980
MATHEMATICAL SCIENCES NORTHWEST, INC., BELLEVUE, WASH.
Design investigation of solar powered lasers for space applications
[NASA-CR-159554] N79-26384
MB ASSOCIATES, SAN RAMON, CALIF.
Process development for automated solar cell and module production. Task 4: Automated array assembly
[NASA-CR-158723] N79-26497
MCDONNELL AIRCRAFT CO., ST. LOUIS, MO.
Thrust and mass flow characteristics of four 36 inch diameter tip turbine fan thrust vectoring systems in and out of ground effect
[NASA-CR-152239] N79-26056
MCDONNELL-DOUGLAS ASTRONAUTICS CO., HUNTINGTON BEACH, CALIF.
Optimum tail fairings for bodies of revolution
[AD-A067927] N79-26031
Central receiver thermal power system
[AED-CONF-78-212-008] N79-26513
MCDONNELL-DOUGLAS ASTRONAUTICS CO., ST. LOUIS, MO.
Investigation of the free flow electrophoretic process. Volume 1: Executive summary
[NASA-CR-161241] N79-26132
Investigation of the free flow electrophoretic process. Volume 2: Technical analysis
[NASA-CR-161240] N79-26133
MECHANICAL PROPERTIES DATA CENTER, TRAVERSE CITY, MICH.
The mechanical properties data center
[AD-A067974] N79-27016
METEOROLOGISCHES OBSERVATORIUM, HOHENPEISSENBERG [WEST GERMANY].
Quantitative precipitation measurements by radar in the Ammer Mountains
N79-26624
Daily variation of near-surface ozone at mountain stations
N79-26642
MIAMI UNIV., CORAL GABLES, FLA.
Warping torsion of reinforced concrete beams with thin-walled open sections
N79-26424
Lake-effect storms of Lake Ontario
N79-26616
MICHIGAN UNIV., ANN ARBOR.
Capacitance matrix methods for the Helmholtz equation on general three-dimensional regions
[COO-3077-155] N79-26853
MIDWEST RESEARCH INST., KANSAS CITY, MO.
Chemical technology and economics in environmental perspective. Task 1: Analysis of the sources of phosphorus in the environment
[PB-293376/0] N79-26568

MINISTRY OF DEFENCE, LONDON [ENGLAND].
Helicopter Icing Symposium
[AD-A067981] N79-26048
The effect of weathering on the modulus of rupture of VHR2A and VHR3A glass [Glaverbel-Mecaniver SA]
[DR-MAT-210] N79-26216
MINNESOTA UNIV., MINNEAPOLIS.
Heat/mass transfer characteristics and fluid flow patterns for airflow about an inclined and yawed flat plate
N79-26011
Growth and structure of ion beam sputtered thin films of gold and cadmium sulfide on silicon substrate
N79-26131
Morphology and sintering of platinum, palladium, rhodium and platinum-alloys on SiO_2 and graphite
N79-26168
Prediction of flow and heat transfer in internally finned tubes
N79-26343
A control-volume based finite element method for convective heat and mass transfer
N79-26354
Local and average heat transfer characteristics for turbulent air flow in an asymmetrically heated tube
N79-26357
Experiments heat transfer and pressure drop for an array of colinear interrupted plates
N79-26358
Polyethylene deformation analysis
N79-26425
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898
MISSION RESEARCH CORP., SANTA BARBARA, CALIF.
On the limits of applicability of the space-charge-limited P-dot driver
[AD-A066131] N79-26104
MISSISSIPPI STATE UNIV., MISSISSIPPI STATE.
Development of partial channel flow for arbitrary input velocity distributions using boundary-fitted coorinate systems
[AD-A067623] N79-26365
MISSOURI UNIV. -ROLLA.
The physics of braided-shield coaxial cable
N79-26251
MITRE CORP., MCLEAN, VA.
Telehealth handbook: A guide to telecommunications technology for rural health care
[PB-292557/6] N79-26778
MOBIL TYCO SOLAR ENERGY CORP., WALTHAM, MASS.
Large area silicon sheet by EFG
[NASA-CR-158731] N79-26501
MONTPELLIER UNIV. [FRANCE].
Relationship between Dirac and matrix Schroedinger inverse scattering transforms
[PM/78/6] N79-26854
MOTOROLA, INC., PHOENIX, ARIZ.
Solar cell modules with parallel oriented interconnections
[NASA-CR-158742] N79-26493

N

NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL, WASHINGTON, D. C.
The chemistry of disinfectants in water: Reactions and products
[PB-292776/2] N79-26554
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, WASHINGTON, D. C.
Aerospace Medicine and Biology: A continuing bibliography with indexes, supplement 194
[NASA-SP-7011(194)] N79-26770
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. AMES RESEARCH CENTER, MOFFETT FIELD, CALIF.
Fuel-conservative guidance system for powered-lift aircraft
[NASA-TM-78595] N79-26009
Control of forebody three-dimensional flow separations
[NASA-TM-78593] N79-26014
Wind-tunnel investigation of highly maneuverable supersonic V/STOL fighter
[NASA-TM-78599] N79-26017
Quiet propulsive lift for commuter airlines
[NASA-TM-78596] N79-26035
Fire protection covering for small diameter missiles
[NASA-CASE-ARC-11104-1] N79-26100
The 1977 intertropical convergence zone experiment
[NASA-TM-78577] N79-26715
Operational activities
N79-26717
Measurement of NO and O3 from aircraft: 1977 tropical convergence zone experiment
N79-26720
Trace constituent mixing ratios in the lower stratosphere during the 1977 intertropical convergence zone experiment
N79-26721
Stratospheric aerosols in the intertropical convergence zone, Panama Canal zone
N79-26725
Airborne pressure and temperature measurements during the 1977 intertropical convergence zone experiment
N79-26727
Pressure and temperature measurements from the U-2 aircraft during the 1977 intertropical convergence experiment
N79-26728
A long-range and long-life telemetry data-acquisition system for heart rate and multiple body temperatures from free-ranging animals
[NASA-TM-78590] N79-26762
Biomedical ultrasonoscope
[NASA-CASE-ARC-10994-2] N79-26771
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. HUGH L. DRYDEN FLIGHT RESEARCH CENTER, EDWARDS, CALIF.
Ground-based measurements of the wake vortex characteristics of a B-747 aircraft in various configurations
[NASA-TM-80474] N79-26016
Evaluation of a simplified gross thrust calculation technique using two prototype F100 turbofan engines in an altitude facility
[NASA-TP-1482] N79-26057
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.
Flight Mechanics/Estimation Theory Symposium
[NASA-CP-2082] N79-26082
A digital scene matching technique for geometric image correction and autonomous navigation
N79-26085
INTELSAT 4 in orbit liquid slosh tests and problems in the theoretical analysis of the data
N79-26091
Shoe-box orbit determination system for SMM preliminary results
N79-26092
On-board orbit determination for application satellites
N79-26093
Relativistic information of the GPS-NAVSTAR position determination algorithm
N79-26095
Transfer trajectory design for a shuttle launched geosynchronous payload
N79-26097
A scannable beam-forming interferometer antenna array system
[NASA-CASE-GSC-12365-1] N79-26252
Magnetic dips in the solar wind
[NASA-TM-80477] N79-27053
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LYNDON B. JOHNSON SPACE CENTER, HOUSTON, TEX.
Briefing Materials for Plenary Presentations: The LACIE Symposium
[E79-10217] N79-26444
Catalog of far-ultraviolet objective-prism spectrophotometry: Skylab experiment S-019, ultraviolet steller astronomy
[NASA-RP-1031] N79-27057
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. JOHN F. KENNEDY SPACE CENTER, COCOA BEACH, FLA.
Prosthesis coupling
[NASA-CASE-KSC-11069-1] N79-26772
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LANGLEY RESEARCH CENTER, HAMPTON, VA.
Fuselage surface pressure measurements of a helicopter wind-tunnel model with a 3.15-meter diameter single rotor
[NASA-TM-80051] N79-26015
Effects of wing leading-edge deflection on low-speed aerodynamic characteristics of a low-aspect-ratio highly swept arrow-wing configuration
[NASA-TP-1434] N79-26020
Effect of several geometric parameters on the static internal performance of three nonaxisymmetric nozzle concepts
[NASA-TP-1468] N79-26022
Effect of nose bluntness and afterbody shape on aerodynamic characteristics of a monoplanar missile concept with bodies of circular and elliptical cross sections at a Mach number of 2.50
[NASA-TM-80055] N79-26023
A simulation investigation of cockpit display of aircraft traffic during curved, descending, decelerating approaches
[NASA-TM-80098] N79-26052
Full-scale aircraft simulation with cryogenic tunnels and status of the National Transonic Facility
[NASA-TM-80085] N79-26064
Magnetic suspension and pointing system
[NASA-CASE-LAR-11889-1] N79-26372
Large volume multiple path nuclear pumped laser
[NASA-CASE-LAR-12592-1] N79-26385
Effects of truncation of a predominantly compression load spectrum on the life of a notched graphite/epoxy laminate
[NASA-TM-80114] N79-26427
Effects of noise frequency on performance and annoyance
[NASA-TM-80107] N79-26781
Effect of helicopter noise on passenger annoyance
[NASA-TM-80106] N79-26782
Trends in reliability modeling technology for fault tolerant systems
[NASA-TM-80089] N79-26810
An evaluation of linear acoustic theory for a hovering rotor
[NASA-TM-80059] N79-26881
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. LEWIS RESEARCH CENTER, CLEVELAND, OHIO.
Computer programs for calculating two-dimensional potential flow through deflected nozzles
[NASA-TM-79144] N79-26019
Performance of a 14.9-kW laminated-frame dc series motor with chopper controller
[NASA-TM-79177] N79-26316
Electrochemical cell for rebalancing REDOX flow system
[NASA-CASE-LEW-13150-1] N79-26474
Handbook of data on selected engine components for solar thermal applications
[NASA-TM-79027] N79-26476
Solar thermal power-conversion system
N79-26477
Rankine-cycle component characteristics
N79-26478
Brayton-cycle component characteristics
N79-26479
Stirling engine characteristics
N79-26480
Speed reducers-increasers
N79-26481
Commercial synchronous alternating-current generators
N79-26482
Power-conversion system component summation
N79-26483
Candidate power-conversion system cycles, appendix A
N79-26484
The use of wind data with an operational wind turbine in a research and development environment
[NASA-TM-73832] N79-26502
A method for correlating performance data of a terrestrial solar cell array
[NASA-TM-79163] N79-26503
Large horizontal axis wind turbine development
[NASA-TM-79174] N79-26504
Recent advances in redox flow cell storage systems
[NASA-TM-79186] N79-26505
Low-power baseline test results for the GPU 3 Stirling engine
[NASA-TM-79103] N79-27023
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. MARSHALL SPACE FLIGHT CENTER, HUNTSVILLE, ALA.
General purpose rocket furnace
[NASA-CASE-MFS-23460-1] N79-26075
Proceedings of workshops to define engineering requirements for a space vacuum research facility
[NASA-CP-2091] N79-26076
Proceedings of workshops to define engineering requirements for a space vacuum research Facility: Summary
N79-26077
NASA workshop on outgassing
N79-26078
Contour measurement system
[NASA-CASE-MFS-23726-1] N79-26439
Method of construction of a multi-cell solar array
[NASA-CASE-MFS-23540-1] N79-26475
SCATS: SRB Cost Accounting and Tracking System handbook
[NASA-TM-78302] N79-27002
The Space Telescope Observatory
[NASA-TM-78301] N79-27043
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. PASADENA OFFICE, CALIF.
Echo tracker/range finder for radars and sonars
[NASA-CASE-NPO-14361-1] N79-26253
Low current linearization of magnetic amplifier for dc transformer
[NASA-CASE-NPO-14617-1] N79-26311
Push-pull converter with energy saving circuit for protecting switching transistors from peak power stress
[NASA-CASE-NPO-14316-1] N79-26312
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION. WALLOPS STATION, WALLOPS ISLAND, VA.
Balloon-borne ozonesonde and rocket temperature and wind data gathered during the July 1977 intertropical convergence zone experiment
N79-26719
Balloon-borne ECC ozonesonde data, appendix A
N79-26729
NATIONAL BUREAU OF STANDARDS, BOULDER, COLO.
Radio frequency liquid level gauging in propane tank car safety tests: A feasibility study
[PB-292978/4] N79-26381

NATIONAL BUREAU OF STANDARDS, WASHINGTON, D. C.
Microphone windscreen performance
[PB-292967/7] N79-26289
Computer sciences and technology: Computer peripheral memory system forecast
[PB-294148/2] N79-26799
Semiconductor measurement technology: DISTRIB 1, an impurity redistribution computer program
[PB-293293/7] N79-26994
Data base available at the National Bureau of Standards Library
[PB-293170/7] N79-27021
NATIONAL GEOPHYSICAL AND SOLAR-TERRESTRIAL DATA CENTER, BOULDER, COLO.
Solar-geophysical data number 414 [supplement], February 1979. Part 1: Prompt Reports. Data for December 1978 - January 1979
[PB-294770/3] N79-27054
Solar-geophysical data number 414 [supplement], February 1979. Part 2: Comprehensive reports. Data for August - July 1978 and miscellanea
[PB-294771/1] N79-27055
Solar-geophysical data number 414 [supplement], February 1979: Explanation of data reports
[PB-294772/9] N79-27056
NATIONAL INSTITUTES OF HEALTH, BETHESDA, MD.
A primer for MLAB: An on-line modelling laboratory
[PB-292895/0] N79-26822
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, BOULDER, COLO.
The MESA Puget Sound Project, Seattle, Washington
[PB-293906/4] N79-26560
U-2 water vapor burden observations through the tropopause
N79-26726
Feasibility study of satellite-borne lidar global wind monitoring system
[PB-293879/3] N79-26746
Project STORMFURY: Experiments and outlook
[PB-294210/0] N79-26750
Gravity wave propagation in the presence of a current with an arbitrary vertical profile
[PB-293806/6] N79-26758
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, MIAMI, FLA.
Data from the Atlantic Oceanographic and Meteorological Laboratories OTEC plant site study in the Gulf of Mexico, July 1977
[PB-293733/2] N79-26759
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, SILVER SPRING, MD.
A history of air pollution meteorology through 1969
[PB-293741/5] N79-26559
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, WASHINGTON, D. C.
National severe local storms operations plan
[PB-294326/4] N79-26745
NATIONAL PHYSICAL LAB., TEDDINGTON [ENGLAND].
The calculation of optimal aircraft trajectories
[NPL-DNACS-11/78] N79-26051
The determination of the alloying constituents of high speed tool steels by X-ray emission spectroscopy
[NPL-CHEM-94] N79-26197
The resistance of ceramics to chemical attack
[NPL-CHEM-96] N79-26219
Numerical solution of a steady, viscous, axisymmetric cavity-flow problem
[NPL-DNACS-12/79] N79-26368
Activities of the Division of Quantum Metrology
[NPL-QU-AR-76] N79-26736
The design and implementation of software for unconstrained optimization
[NPL-DNACS-8/78] N79-26820
The least squares adjustment of errors in level surveys
[NPL-DNACS-9/78] N79-26862
Kronecker's canonical form and the QZ algorithm
[NPL-DNACS-10/78] N79-26863
Note on the practical significance of the Drazin inverse
[NPL-DNACS-13/79] N79-26864
Manual audiometry: A comparison of two methods
[NPL-AC-88] N79-26890
NATIONAL RESEARCH COUNCIL, PISA [ITALY].
SIRIO: One year of station keeping
N79-26098
NATIONAL SPACE DEVELOPMENT AGENCY, TOKYO [JAPAN].
Spin axis tilt of satellite induced by the internal fluid migration
[NASDA-TR-8] N79-26103
NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VA.
Parachutes and decelerators, volume 2. A bibliography with abstracts
[NTIS/PS-79/0368/5] N79-26033
Cosmic rays, volume 1. A bibliography with abstracts
[NTIS/PS-79/0386/7] N79-27059
Cosmic rays, volume 2. A bibliography with abstracts
[NTIS/PS-79/0387/5] N79-27060
NATIONAL TELECOMMUNICATION INFORMATION ADMINISTRATION, BOULDER, COLO.
Aircraft obstruction of microwave links
[PB-292372/0] N79-26288
NATIONAL TRANSPORTATION SAFETY BOARD, WASHINGTON, D. C.
Aircraft accident report: Las Vegas Airlines, Piper PA-31-350, N44LV, Las Vegas, Nevada, August 30, 1978
[NTSB-AAR-79-8] N79-26034
NATIONAL WEATHER SERVICE, FORT WORTH, TEX.
Manually digitized radar data: Interpretation and application
[PB-293810/8] N79-26747
NATIONAL WEATHER SERVICE, SALT LAKE CITY, UTAH.
A simple analysis/diagnosis system for real time evaluation of vertical motion
[PB-294216/7] N79-26742
LFM 24-hour prediction of eastern Pacific cyclones refined by satellite images
[PB-294324/9] N79-26744
NAVAL AIR DEVELOPMENT CENTER, WARMINSTER, PA.
Feasibility of non-catapult ejection and hazard of an ejection seat rocket plume
[AD-A067080] N79-26036
Development of an inflatable head/neck restraint system for ejection seats, update
[AD-A067124] N79-26038
NAVAL OCEAN SYSTEMS CENTER, SAN DIEGO, CALIF.
MINIMUF-3.5 improved version of MINIMUF-3, a simplified HF MUF prediction algorithm
[AD-A066256] N79-26256
Shipboard antenna pattern inversion using Prony's method
[AD-A068018] N79-26262
Radar system analysis algorithms: Radar system analysis models of performance degradation by mutual interference
[AD-A068019] N79-26263
Low cost components: Selection and acquisition of microelectronic devices
[AD-A067667] N79-26321
Direct execution language architecture for simulation
[AD-A067824] N79-26793
Commercial digital/ADP equipment in an ocean environment. Volume 1: Performance study
[AD-A067662] N79-26796
Spectral estimation using Poisson distributed time series data with time quantization
[AD-A067324] N79-26867
Evaluation of the two-dimensional Fourier transform applied to acoustic image pattern measurements
[AD-A068017] N79-26888
NAVAL RESEARCH LAB., WASHINGTON, D. C.
ARIS manual
[AD-A067830] N79-26139
The NRL program on electroactive polymers
[AD-A067736] N79-26213
Free electron lasers and stimulated scattering from relativistic electron beams
[AD-A066177] N79-26387
Theory of solid state cyclotron maser
[AD-A066174] N79-26389
Destruction of cyclotron resonances in weakly collisional, inhomogeneous plasmas
[AD-A067827] N79-26596
Plasma instabilities in the equatorial F-region: Natural and artificial mechanisms
[AD-A068040] N79-26598
Feasibility of shipboard laser-attenuation measurements with a portable transmissometer
[AD-A067665] N79-26732
Collective radio-emission from plasmas
[AD-A066923] N79-26944
NAVAL SHIP RESEARCH AND DEVELOPMENT CENTER, BETHESDA, MD.
Aerodynamic characteristics of the close-coupled canard as applied to low-to-moderate swept wings. Volume 2: Subsonic speed regime
[AD-A067122] N79-26025
The characteristics of the spray generated by the efflux of various aircraft propulsors impinging normally on water
[AD-A067742] N79-26049
APES-finite element fracture mechanics analysis revised documentation
[AD-A066246] N79-26430
NAVAL SURFACE WEAPONS CENTER, DAHLGREN, VA.
An automated software maintence tool for large-scale operating systems
[AD-A067799] N79-26813
Development of mathematical software and mathematical software libraries
[AD-A068023] N79-26814
NAVAL UNDERWATER SYSTEMS CENTER, NEW LONDON, CONN.
Numerical solutions of underwater acoustic wave propagation problems
[AD-A067023] N79-26887
NAVAL WEAPONS CENTER, CHINA LAKE, CALIF.
Navy laboratory interactive graphics study
[AD-A067402] N79-26816
NEBRASKA STATE DEPT. OF ROADS, LINCOLN.
Structural design of flexible pavement. Part 1: Summary of performance
[PB-292787/9] N79-26245
Structural design of flexible pavement. Part 3: Analysis of performance study data
[PB-292838/0] N79-26246
NEBRASKA UNIV. - LINCOLN.
The relationship of the thermal regime of the soil to the extrinsic environment, with special reference to the north central United States
N79-26582
NEVADA UNIV. SYSTEM, RENO.
Digital simulation of snowmelt runoff
[PB-293252/3] N79-26457
NEW HAMPSHIRE UNIV., DURHAM.
Fate of metal ions during domestic treatment of water containing organics
[PB-293147/5] N79-27034
NEW YORK UNIV., N. Y.
Automatic data structure choice in SETL
N79-26802
Renormalization group transformations for 7-spin triangular lattice
N79-26969
The applications of the GISS Vidicon system: Selected topics in astrophysics
N79-27041
NIELSEN ENGINEERING AND RESEARCH, INC., MOUNTAIN VIEW, CALIF.
Computer program for calculation of separated turbulent flows on axisymmetric afterbodies including exhaust plume effects
[AD-A066925] N79-26363
NORTH DAKOTA UNIV., GRAND FORKS.
A study of the construction of a distributive processing system using standard components
N79-26791
NORTHROP RESEARCH AND TECHNOLOGY CENTER, PALOS VERDES PENINSULA, CALIF.
Investigation of gain and absorption processes in the cadmium-mercury excimer
[AD-A066321] N79-26388
NORTHWESTERN UNIV., EVANSTON, ILL.
Electronically induced phase transformations
[AD-A067066] N79-26983

O

OAK RIDGE NATIONAL LAB., TENN.
Characterization of multialkylated polycyclic aromatic hydrocarbons in energy-related materials
[CONF-781039-9] N79-26147
Preliminary thoughts on proxy PNA
[CONF-781150-5] N79-26148
Solidification behavior of type 308 stainless steel filler metal
[ORNL-TM-6644] N79-26179
Oxygen partial pressure: A key to alloying and discovery in metal oxide-metal eutectic systems
[CONF-781172-1] N79-26182
Relative chemical composition of selected synthetic crudes
[CONF-781150-4] N79-26231
ORNL PWR-BDHT two-phase flow instrumentation and analysis improvements
[CONF-781146-9] N79-26366
Approximate method of elastic-plastic fracture analysis for nozzle corner cracks
[NUREG/CR-0472] N79-26433
Use of waste heat from nuclear power plants
[CONF-7811109-4] N79-26527
Resistive ballooning mode equation
[ORNL-TM-6629] N79-26954
Numerical software support for the fusion energy program at Oak Ridge
[CONF-780763-1] N79-26955
Inventory of data bases, graphics packages, and models in Department of Energy laboratories
[ORNL-EIS-144] N79-27018
OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, D. C.
Information technology and governmental reorganization: Summary of the Federal Data Processing Reorganization Project
[PB-294543/4] N79-26800
OFFICE OF NAVAL RESEARCH, TOKYO [JAPAN].
High pressure science and technology in Japan
[ONRT-M1] N79-26361
OFFICE OF RADIATION PROGRAMS, LAS VEGAS, NEV.
Near-field radiation properties of simple linear antennas with applications to radiofrequency hazards and broadcasting
[PB-292647/5] N79-26290

OFFICE OF RADIATION PROGRAMS, SILVER SPRING, MD.
Radiofrequency radiation levels and population exposure in urban areas of the eastern United States
[PB-292855/4] N79-26779
OFFICE OF SCIENCE AND TECHNOLOGY, WASHINGTON, D. C.
Earth information from space by remote sensing
[PB-292736/6] N79-26454
OFFICE OF TECHNOLOGY ASSESSMENT, WASHINGTON, D. C.
Annual report to the Congress for 1978
[PB-293088/1] N79-27027
OFFICE OF THE PROJECT MANAGER HIGH ENERGY LASER, REDSTONE ARSENAL, ALA.
Optical quality of tilted spherical mirror unstable resonators
[AD-A068015] N79-26394
OHIO STATE UNIV., COLUMBUS.
An accurate reliability modeling technique for hybrid modular redundant digital systems using modular characteristic error parameters
N79-26413
Techniques of cumulative quantitative characterization of the thorax using audiosonic methods
N79-26769
Approximate tests of hypotheses in regression models with grouped data
[AD-A066926] N79-26845
Information flow and analysis: Theory simulation, and examples. Part 1: Basic theoretical and conceptual development. Part 2: Simulation, examples and results
[PB-293458/6] N79-27007
OHIO STATE UNIV. RESEARCH FOUNDATION, COLUMBUS.
Investigation of infrared spectra of atmospheric gases to support stratospheric spectroscopic investigations
[NASA-CR-158716] N79-26586
OKLAHOMA STATE UNIV., STILLWATER.
Analysis of rigid pavement on viscoelastic foundation subjected to moving loads
N79-26422
Study of base plates for axially loaded columns
N79-26423
Computational experiments with systems of nonlinear equations
N79-26841
OKLAHOMA UNIV., NORMAN.
Lifting bodies derived from supersonic flows past inclined circular and elliptic cones
[AD-A068003] N79-26026
Supersonic flow past conical bodies with nearly circular cross sections
[AD-A068004] N79-26027
Hypersonic flow past a slender elliptic cone
[AD-A068002] N79-26028
A contribution to the severe storms intercept project, 1978
[PB-293472/7] N79-26741
Research on severe local storms
[PB-293924/7] N79-26748
OLD DOMINION UNIV. RESEARCH FOUNDATION, NORFOLK, VA.
Investigations into the mechanical behavior of composite bolted joints
[NASA-CR-158752] N79-26402
OPTICAL COATING LAB., INC., CITY OF INDUSTRY, CALIF.
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158736] N79-26488
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158735] N79-26495
OREGON GRADUATE CENTER, BEAVERTON.
Statistics of speckle propagation
[AD-A067885] N79-26933
OREGON STATE UNIV., CORVALLIS.
Seventh year projects and activities of the Environmental Remote Sensing Applications Laboratory [ERSAL]
[E79-10220] N79-26447
Notes on the meteorology of the intertropical convergence zone during the July 1977 experiment
N79-26718
CTD observations off the coast of Peru, R/V Melville, 4 March - 22 May 1977, and R/V Columbus Iselin, 5 April - 19 May 1977
[PB-293377/8] N79-26761
OXFORD UNIV. [ENGLAND].
Second principle of thermodynamics, direction of heat flow and Fourier inequality: A comparative assessment
[OUEL-1255/78] N79-26369
Elastic-plastic tension-torsion in a circular bar of rate-sensitive material
[OUEL-1265/78] N79-26436
On the stability and convergence of self-tuning algorithms
[OUEL-1259/78] N79-26833

P

PARIS VIII UNIV., VILLETANEUSE [FRANCE].
Spring in the Alps: A study of temperature increase
N79-26660
PARMA UNIV. [ITALY].
Snow on the Po watershed of the Northern Apennines
N79-26702
PATENT AND TRADEMARK OFFICE, WASHINGTON, D. C.
Technology assessment and forecast report
[PB-293380/2] N79-27030
PENNSYLVANIA STATE UNIV., UNIVERSITY PARK.
The dynamic modelling of a slotted test section
[NASA-CR-159069] N79-26065
The role of mold atmospheres in the penetration of molten steel into sand molds
N79-26163
PENNSYLVANIA UNIV., PHILADELPHIA.
Analysis and evaluation of processes and equipment in tasks 2 and 4 of the low-cost solar array project
[NASA-CR-158744] N79-26485
FQL a functional query language
[AD-A066992] N79-26812
Model management systems: A framework for development
[AD-A067246] N79-27003
A database interface to WAND for the network alerter service
[AD-A066993] N79-27010
Q, a communications query language for SEED
[AD-A066994] N79-27011
Extensible data bases
[AD-A067015] N79-27012
Control programs and data structures for a multiple alerter implementation in a relational data base
[AD-A067168] N79-27013
The multiple path problem in data base schemata
[AD-A067147] N79-27015
POLYTECHNIC INST. OF NEW YORK, BROOKLYN.
Future directions for public transportation: A basis for decision
[PB-292781/2] N79-27024
PRATT AND WHITNEY AIRCRAFT GROUP, EAST HARTFORD, CONN.
Rotor redesign for a highly loaded 1800 ft/sec tip speed fan. 1: Aerodynamic and mechanical design report
[NASA-CR-159596] N79-26055
Chemical composition of exhaust particles from gas turbine engines
[PB-292380/3] N79-26563
PRINCETON UNIV., N. J.
Combustion optimization studies for stratified charge and diesel engines
[COO-4191-1] N79-26149
Melt elasticity studies: Recoverable strain and recoverable strain rate of polymer melts
N79-26208
Theory of thermionic energy converter with variable plasma electron temperature
[COO-2533-10] N79-26521
Redundancy analysis and associated asymptotic distribution theory
N79-26865
SLPX: Superconducting long-pulse tokamak experiment
[PPPL-1488] N79-26947
Analytical theory of drift waves and drift Alfven waves in tokamaks
[PPPL-1512] N79-26958
Study of electronic transport and breakdown in thin insulating films
[AD-A066918] N79-26984
PROPELLANTS, EXPLOSIVES AND ROCKET MOTOR ESTABLISHMENT, WESTCOTT [ENGLAND].
Construction of a high performance resistojet for satellite propulsion
[PERME-TR-99] N79-26112
PUBLIC SERVICE ELECTRIC AND GAS CO., NEWARK, N. J.
Blending of hydrogen in natural gas distribution systems. Volume 3: Gas blends leakage tests of selected distribution system components
[CONS/2925-3] N79-26229
PUK [RICHARD F.], ALBUQUERQUE, N. MEX.
Host-computer implementation guidelines for the three-dimensional Graphics Compatibility System [GCS]
[AD-A067976] N79-26815
PURDUE UNIV., LAFAYETTE, IND.
Simple models for computing dynamic responses of complex frame structures
[PB-292798/6] N79-26243
Theoretical study of the dynamic response of a chimney to earthquake and wind
[PB-293561/7] N79-26244
Interactive multiple objective optimization
[PB-293211/9] N79-26468

R

RAYTHEON CO., BEDFORD, MASS.
Prelidding burn-in evaluation
[AD-A067224] N79-26318
RCA ADVANCED TECHNOLOGY LABS., CAMDEN, N. J.
Radiation hardened CMOS/SOS code generator for space applications
[AD-A067980] N79-26327
RCA CORP., LANCASTER, PA.
Manufacturing methods and technology measure for fabrication of silicon transcalent rectifier
[AD-A067880] N79-26328
RCA GOVERNMENT COMMUNICATIONS SYSTEMS, CAMDEN, N. J.
EMS [Electronic Message Service]: System definition and evaluation. Executive summary
[PB-292933/9] N79-26291
EMS [Electronic Message Service]: System definition and evaluation
[PB-292934/7] N79-26292
REGIS COLL., WESTON, MASS.
Meteorological studies: Atmospheric analysis, automated weather system development, satellite studies
[AD-A067937] N79-26733
RENSSELAER POLYTECHNIC INST., TROY, N. Y.
The effect of environmental variables on the pitting corrosion behavior of single and duplex phase 304L stainless steel
N79-26157
An investigation of duplex weld solidification in austenitic stainless steels
N79-26158
High-cycle fatigue behavior of a cobalt-based eutectic alloy
N79-26161
Light scattering from phase separated glass
N79-26207
Corona performance of toroidal electrodes for high voltage equipment
N79-26309
Factors affecting the usefulness of flow charts and other formats for computer programs
N79-26803
Nonlinear waves as particles
N79-26880
Mathematical programming solution to the phase problem of crystallography
N79-26970
RESEARCH INST. OF NATIONAL DEFENCE, STOCKHOLM [SWEDEN].
Algorithms needed in a natural language understanding system
[PB-293232/5] N79-26823
RESEARCH TRIANGLE INST., RESEARCH TRIANGLE PARK, N. C.
Determination of crosslinking in high T sub g polymers
[AD-A067185] N79-26211
A study of an electrodeless glow discharge as a means of modifying the surface of polymers
[PB-293570/8] N79-26220
Assessment of the use of fugitive emission control devices
[PB-292748/1] N79-26551
Level 1 environmental assessment performance evaluation
[PB-292931/3] N79-26564
A preliminary study of built-in-test for the Military Computer Family [MCF]
[AD-A067744] N79-26795
RHODE ISLAND UNIV., KINGSTON.
Geotechnical aspects of subsurface seabed disposal of high level radioactive wastes
[COO-4069-1] N79-26918
ROCHESTER UNIV., N. Y.
Symmetries and statistical behavior in fermion systems
[COO-2171-184] N79-26895
Low energy ion-molecule reaction dynamics and chemiionization kinetics
[COO-4694-1] N79-26897
Pion dissociation in the nuclear Coulomb field
[COO-1764-337] N79-26898
Hadron-nucleus inclusive data from Fermilab
[COO-3065-210] N79-26912
ROCKWELL INTERNATIONAL CORP., ANAHEIM, CALIF.
Solvent removable coatings for contaminant protection of microcircuits
[AD-A067745] N79-26212
ROCKWELL INTERNATIONAL CORP., CREVE COUER, MO.
Regional air pollution study, emission inventory summarization
[PB-293164/0] N79-26574
ROCKWELL INTERNATIONAL CORP., EL SEGUNDO, CALIF.
Fracture toughness in titanium alloys
[AD-A067785] N79-26176
Lower cost by substituting steel for titanium
[AD-A067997] N79-26177

ROME AIR DEVELOPMENT CENTER, GRIFFISS AFB, N.Y.
Modem identification experiments
[AD-A067538] N79-26829
ROYAL AIRCRAFT ESTABLISHMENT, FARNBOROUGH (ENGLAND).
A study of smoke movement in an aircraft fuselage
[RAE-TM-EP-613] N79-26040
Reliability and launching policy for a system of satellites
[RAE-TR-78081] N79-26106
A review of the UK T5 electron-bombardment mercury ion thruster
[RAE-TR-77191] N79-26109
Stress corrosion cracking of high strength Al-Zn-Mg-Cu alloys: Matrix precipitation
[RAE-TR-78110] N79-26174
The effect of grain structure on the stress corrosion resistance of Al-Zn-Mg-Cu alloys
[RAE-TR-78034] N79-26193
The tearing of weathered rubber-coated fabrics
[RAE-TR-78005] N79-26218
Low noise devices for satellite communication systems
[RAE-TR-78076] N79-26279
The design of a high packing density PCM magnetic tape replay system
[RAE-TR-77140] N79-26378
An automatic portable telecine camera
[RAE-TM-IT-177] N79-26379
Wear properties of dry bearing liners at ambient and elevated temperatures: A preliminary survey
[RAE-TR-78063] N79-26407
A microprocessor sequencer for the UK T5 ion thruster and power conditioner unit
[RAE-TR-78057] N79-26797
The microprocessor and its application in a laboratory environment
[RAE-TM-IT-165] N79-26798
Note on a time dependent queue M/D/1 with input equal to service rate
[RAE-TM-MATH-COMP-7807] N79-26832
Expansions in series of Chebyshev polynomials of a function occuring in linear unsteady aerodynamic theory
[RAE-TR-77110] N79-26871
ROYAL NETHERLANDS METEOROLOGICAL INST., DE BILT.
Objective classification of daily 500 mbar patterns
[KNMI-WR-78-8] N79-26737
Comparative investigation of dynamic properties of some propeller vanes
[KNMI-WR-78-1] N79-26738
ROYAL OBSERVATORY, EDINBURGH (SCOTLAND).
The UK 1.2m Schmidt telescope and the southern sky survey. Part 2: Photographic techniques
[ROE-OR-4-PT-2] N79-27046
ROYAL SIGNALS AND RADAR ESTABLISHMENT, MALVERN (ENGLAND).
Planning and control of software based systems
[RSRE-78012] N79-26825

S

SACLANT ASW RESEARCH CENTER, LA SPEZIA (ITALY).
Satellite oceanography of eastern boundary currents and its implications to ASW
[AD-A067259] N79-26754
SANDIA LABS., ALBUQUERQUE, N. MEX.
Sandia laboratory combustion simulation facility
[SAND-78-2240] N79-26146
Vertical axis wind turbine status
[SAND-78-0397C] N79-26512
Proceedings of the Workshop on Mechanical Storage of Wind Energy
[SAND-79-0001] N79-26528
System study on the feasibility of a coal-fired total-energy plant [with solar options] for Sandia Laboratories
[SAND-78-0979] N79-26530
Risk methodology for geologic disposal of radioactive waste
[NUREG/CR-1458] N79-26906
Seabed disposal program, volume I
[SAND-78-1359] N79-26909
SANDIA LABS., LIVERMORE, CALIF.
Hydrogen compatibility of structural materials for energy storage and transmission
[SAND-79-8200] N79-26183
Preliminary studies of microchannel plate photomultiplier tube neutron detectors for flight test applications
[SAND-78-8266] N79-26332
SAVEZNI HIDROMETEOROLOSKI ZAVOD, BELGRADE (YUGOSLAVIA).
Inclusion of the orographic error in the numerical forecast model
N79-26671
SCHWEIZERISCHE METEOROLOGISCHE ZENTRALANSTALT, ZURICH.
Proceedings of the Fifteenth International meeting on Alpine Meteorology, volume I
[SZ-ISSN-0080-7346] N79-26623
Mountains and atmospheric boundary layers
N79-26626
Subsidence effects of the Alps
N79-26628
Objective regional forecast for the Bernese Alps
N79-26635
Forecast of air pollution in deep valleys
N79-26640
Strong winds and weather conditions in Dinaric Alps
N79-26646
Zones of convergence in local air flow in valleys and basins
N79-26648
Local winds in Zagreb
N79-26649
Biological effects of high altitude climate and its therapeutic applications
N79-26650
Microclimatic conditions in the mountain mixed forest at different cutting procedures
N79-26653
Table-maps as a method of representing data on climate of mountainous regions with examples from Norwegian phenology and of precipitation distribution over the eastern Alps
N79-26658
Cloudiness situation in the Alpine region under various weather conditions
N79-26662
Fine-mesh numerical forecasting in Switzerland
N79-26667
Topography of the 0 deg isotherm in the northern Alps in winter time
N79-26680
SCIENCE APPLICATIONS, INC., LA JOLLA, CALIF.
Model of Advection, Diffusion and Chemistry of Air Pollution [MADCAP], evaluated at San Diego, air basin.
[PB-292526/1] N79-26565
SEMCOR, INC., MOORESTOWN, N. J.
Atlas of infrared imagery of the sea surface
[AD-A067731] N79-26756
SERVIZIO METEOROLOGICO DELL'AERONAUTICA MILITAIRE (ITALY).
Contribution of orography, thermal wind, and transient eddies to quasistationary waves
N79-26676
SETON, JOHNSON AND ODELL, INC., PORTLAND, OREG.
Environmental management and energy facility siting in the coastal zone
[PB-292947/9] N79-26539
SLOVAK ACADEMY OF SCIENCES, BRATISLAVA (CZECHOSLOVAKIA).
Certain characteristics of the atmospheric turbidity
N79-26683
SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASS.
Proportional counter for X-ray analysis of lunar and planetary surfaces
[NASA-CR-158754] N79-27051
SOIL CONSERVATION SERVICE, BURLINGTON, VT.
Erosion and sedimentation nonpoint pollution sources and controls, LaPlatte River watershed
[PB-293436/2] N79-26576
SOUTH CAROLINA UNIV., COLUMBIA.
Computer-aided design of microwave integrated parametric amplifiers
N79-26306
SOUTHERN CALIFORNIA ASSOCIATION OF GOVERNMENTS, LOS ANGELES
Draft SCAG-78 growth forecast policy
[PB-293245/7] N79-27032
SOUTHERN METHODIST UNIV., DALLAS, TEX.
Splitting the bump in an elimination factorization
[AD-A067712] N79-26849
SOUTHERN RESEARCH INST., BIRMINGHAM, ALA.
Proceedings: Advances in Particles Sampling and Measurement
[PB-293363/8] N79-26581
SPECTROLAB, INC., SYLMAR, CALIF.
Silicon solar cell process development, fabrication and analysis
[NASA-CR-158740] N79-26490
Array automated assembly, phase 2
[NASA-CR-158728] N79-26498
SPRINGBORN LABS., INC., ENFIELD, CONN.
Investigation of test methods, material properties, and processes for solar cell encapsulants
[NASA-CR-158741] N79-26494
SRI INTERNATIONAL CORP., MENLO PARK, CALIF.
A pilot study of the potential for Navy utilization of solid waste derived fuels to offset fossil fuels consumption
[AD-A067165] N79-26510
Commuter exposure modeling methodologies
[PB-292995/8] N79-26557
Photodissociation cross sections and spectroscopy of atmospheric positive ions
[AD-A067186] N79-26592
Study of modeling and evaluation of remote manipulation tasks with force feedback
[NASA-CR-158721] N79-26785
Management of federal R and D for commercialization: Executive summary
[PB-292851/3] N79-27036
Management of federal R and D for commercialization
[PB-292852/1] N79-27037
Management of federal R and D for commercialization: Appendices: Supporting documentation
[PB-292853/9] N79-27038
STANFORD LINEAR ACCELERATOR CENTER, CALIF.
Harmony in science: Superconductivity and high energy physics
[SLAC-PUB-2237] N79-26905
Weak interactions at high energies
[SLAC-PUB-2177] N79-26914
ATROPOS: A versatile data acquisition and analysis system
[SLAC-PUB-2220] N79-27019
STANFORD UNIV., CALIF.
Diffusivity and solubility of nitrogen in multi-component liquid iron alloys containing alloying elements up to 50 wt% at 1600 C
N79-26162
Thermodynamic and kinetic investigations of liquid metal-oxygen systems using solid state electrochemical methods
N79-26171
Silicon oxide studies: Physical modeling and device applications of thermal oxidation of heavily doped silicon
N79-26300
Preparation and properties of Au-{-n} A sub X Ga sub 1 minus X aS-{n}GaAs Schottky-Barrier solar cells
N79-26473
Determination of the seismic design parameters: A stochastic approach
N79-26585
A framework for problem-solving in a distributed processing environment
N79-26807
Product differentiation in computer services
N79-26824
Aerodynamic sound generation due to vortex-aerofoil interaction. Part 2: Analysis of the acoustic field
[NASA-CR-152231] N79-26883
A fluid description of plasma double-layers
[NASA-CR-158719] N79-26942
Doping process in silicon epitaxy: Transfer function and physicochemical model
N79-26976
Growth of high phase-match temperature LiNbO3 single crystals
[UCRL-13939] N79-26991
Particle acceleration in pulsar magnetospheres
N79-27048
STATE UNIV. OF NEW YORK AT ALBANY.
Chaff seeding in a dynamical-electrical cloud model
N79-26617
STATE UNIV. OF NEW YORK AT BUFFALO.
Studies on flame propagation in powdered mixtures
N79-26128
Quantization for statistical classification
N79-26250
Boundary integral equation methods applied to wave problems
[AD-A067536] N79-26261
Nonlinear system analysis in bipolar integrated circuits
N79-26296
Gallium arsenide metal semiconductor field effect transistor fabrication based upon the processing of an individual die
N79-26298
Vacuum arc switched inverters
N79-26304
A state space approach to hierarchical systems
N79-26872
Contribution to the theory of [N,M]-compact, paracompact and normal spaces
N79-26878
Advanced information processing using microarchitecture programmed design
N79-27008
STOCKHOLM UNIV. (SWEDEN).
The IMI network in Sweden: Present equipment, methods, and plans for improvement
[AC-40] N79-26740
STUTTGART UNIV. (WEST GERMANY).
Basic physical phenomena neutron production and scaling of the dense plasma focus
[IPF-77-7] N79-26961
SYRACUSE UNIV., N. Y.
A literature review on fatigue and creep interaction
[NASA-CR-135305] N79-26429

SYSTEMS APPLICATIONS, INC., SAN RAFAEL, CALIF.
The development of mathematical models for the prediction of anthropogenic viability impairment, volume 1
[PB-293119/4] N79-26613
The development of mathematical models for the prediction of anthropogenic viability impairment. Volume 2: Appendices
[PB-293120/2] N79-26614
The development of mathematical models for the prediction of anthropogenic viability impairment. Volume 3: Case studies for selected scenarios
[PB-293121/0] N79-26615

T

TACTICAL AIR COMMAND, LANGLEY AFB, VA.
A user's guide for TAC PERT
[AD-A068012] N79-27005
TECHNICAL RESEARCH CENTRE OF FINLAND, ESPOO.
Activities of the Technical Research Center of Finland
N79-27062
TECHNISCHE HOGESCHOOL, DELFT [NETHERLANDS].
The role of environment, frequency and wave shape during fatigue crack growth in aluminum alloys
[VTH-LR-270] N79-26187
TECHNISCHE UNIV., BERLIN [WEST GERMANY].
Performance and heat transfer of high energy rocket engines with thrust variation
[ILR-21] N79-26111
TECHNISCHE UNIVERSITAET, MUNICH [WEST GERMANY].
Rendezvous missions to comets with electrically spacecraft
[TUM-LRT-TB-78/6-1] N79-26081
Measurements methods applied to satellite geodesy: Basic Theory
[TUM-MITT-145] N79-26105
Low cost space transportation
[TUM-LRT-TB-78/6-2] N79-26108
Performance of low thrust attitude control engines. Part 1: Nozzle flow and performance prediction
[TUM-LRT-TB-77/5-PT-1] N79-26113
Performance of low thrust attitude control engines. Part 2: Hydrazine engines theoretical performance and transport properties of reaction products
[TUM-LRT-TB-77/6-PT-2] N79-26114
Performance of low thrust attitude control engines. Part 3: Power augmented hydrazine performance and thermodynamic properties of reaction products
[TUM-LRT-TB-77/7-PT-3] N79-26115
Performance of low thrust attitude control engines. Part 4: Correlation equation for experimental boundary layer losses
[TUM-LRT-TB-77/14-PT-4] N79-26116
Performance of low thrust attitude control engines. Part 5: Thrust loss determination by test-data-correlation
[TUM-LRT-TB-78/1-PT-5] N79-26117
Performance of low thrust attitude control engines. Part 6: Computation of boundary layer losses
[TUM-LRT-TB-78/2-PT-6] N79-26118
Quantitative evaluation of the short-wave radiation balance of a glacier
N79-26689
Design of distribution maps of precipitation, evaporation, and runoff in the Alps
N79-26708
An encounter with Halley's comet at 24 km per second
[TUM-LRT-TB-78/5] N79-27052
TENNESSEE UNIV., KNOXVILLE.
Evaluation of the effects of urbanization on storm-water runoff and quality
[PB-293513/8] N79-27035
TERRA TEK, INC., SALT LAKE CITY, UTAH.
Injection of radioactive waste by hydraulic fracturing at West Valley, New York. Volume 4, supplement 1: Cost estimate
[ANL-K-78-4238-1-VOL-4] N79-26919
TEXAS A&M UNIV., COLLEGE STATION.
Least squares prediction for mixed autoregressive moving average time series
[AD-A067768] N79-26850
Pyrogenic activity of carbon-filtered waters
[PB-293172/3] N79-27033
TEXAS INSTRUMENTS, INC., DALLAS.
Techniques for the preparation and analysis of standard silicon semiconductor specimens for the ion microprobe mass analyzer
[PB-292806/7] N79-26341
TEXAS UNIV. AT AUSTIN.
A comparison of filtering algorithms for GPS satellite navigation application
N79-26094
A general martingale approach to discrete time stochastic control and estimation
[AD-A067834] N79-26852
Estimator performance for a class of nonlinear estimation problems
[AD-A067661] N79-26870
Development of practical MO techniques for prediction of the properties and behavior of materials
[AD-A067068] N79-26892
Variability of Lyman-alpha emission from Jupiter
[NASA-CR-158756] N79-27045
Catalog of far-ultraviolet objective-prism spectrophotometry: Skylab experiment S-019, ultraviolet steller astronomy
[NASA-RP-1031] N79-27057
TEXTRON BELL AEROSPACE CO., BUFFALO, N. Y.
Air cushion landing gear applications study
[NASA-CR-159002] N79-26045
TEXTRON BELL HELICOPTER, FORT WORTH, TEX.
System design requirements for advanced rotary-wing agricultural aircraft
[NASA-CR-158938] N79-26046
THESSALONIKI UNIV. [GREECE].
The mountain mass of Olympus as a heating source of the lower troposphere
N79-26688
The orographic effect of Mount Pilion and the Euboea Island [Greece] on distribution of precipitation
N79-26698
TORONTO UNIV. [ONTARIO].
Finite-difference solutions for nonequilibrium laminar boundary layers in ionizing-argon flows
[UTIAS-226] N79-26360
Preliminary wind tunnel simulation study of snow collection gauges
[UTIAS-TN-219] N79-26373
TRANSPORTATION RESEARCH BOARD, WASHINGTON, D. C.
Highway capacity, measures of effectiveness, and flow theory
[PB-292763/0] N79-27029
TRW DEFENSE AND SPACE SYSTEMS GROUP, REDONDO BEACH, CALIF.
Onboard image processing
N79-26083
Multiple scene attitude estimator performance for LANDSAT-1
N79-26087
Device technology for high performance monolithic sample-and-hold circuits
[AD-A067786] N79-26324
Laser assisted semiconductor device processing
[AD-A067183] N79-26988

U

UNILEVER RESEARCH, VLAARDINGEN [NETHERLANDS].
Reduction of silica supported nickel catalysts
N79-26194
Ellipsometry as a tool to study the adsorption behavior of synthetic and biopolymers at the air-water interface
N79-26217
The propagation of surface shear waves. Volume 1: Theory
N79-26277
The propagation of surface shear waves. Volume 2: Experiments
N79-26278
Preparation of some prostaglandin E sub 1 omega-homo-prostaglandin E sub 1 esters and their inhibiting properties on rat blood platelet aggregation
N79-26765
Influences of dietary fats on coronary flow rate and left ventricular work of the isolated rat heart
N79-26766
Effects of dietary fats on the coronary flow rate and the left ventricular function of the isolated rat heart
N79-26767
Effects of dietary fats on atherosclerosis and thrombosis
N79-26776
Physiological effects of a high soybean protein diet in man
N79-26777
UNITED NUCLEAR INDUSTRIES, INC., RICHLAND, WASH.
Welding of copper silicon and zirconium II using the 1200 watt CO2 continuous laser
[UNI-1190] N79-26395
UNITED TECHNOLOGIES RESEARCH CENTER, EAST HARTFORD, CONN.
Feasibility study of automative Stirling engine heaters
[R77-719021] N79-26403
UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.
The one-on-one stochastic duel, parts 1 and 2
[AD-A068008] N79-26869
UNIVERSITY OF SOUTHERN CALIFORNIA, MARINA DEL REY.
Transmission Control Protocol [TCP] version 4
[AD-A067072] N79-26257

A research program in computer technology
[AD-A067123] N79-26792
UNIVERSITY OF WESTERN MICHIGAN, KALAMAZOO.
Markovian multiserver queueing systems with servers in series
N79-26826
UPPSALA IONOSPHERIC OBSERVATORY [SWEDEN].
Accurate determination of ionospheric effects on satellite based positioning systems using a versatile three-dimensional ray tracing program
[UIO-SR-78-04] N79-26267
Use of a single function subroutine for multi-region ionospheric profiles with a versatile three-dimensional ray tracing program
[UIO-SR-78-03] N79-26399
Some significant ionospheric disturbance events during September 1977
[UIO-SR-78-05] N79-26600
UTAH STATE UNIV., LOGAN.
A one-layer model for eddy diffusivity profiles using field data
N79-26664
UTAH UNIV., SALT LAKE CITY.
Laser studies of reactions
[AD-A067855] N79-26393
An investigation of the interaction, evolution and maintenance of the large-scale waves in the stratosphere and troposphere
N79-26584
A hierarchical model of portable input/output
N79-26808

V

VANDERBILT UNIV., NASHVILLE, TENN.
Microwave curing of epoxy resins
[AD-A067732] N79-26214
VARIAN ASSOCIATES, LEXINGTON, MASS.
Slicing of silicon into sheet material. Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158743] N79-26978
Slicing of silicon into sheet material: Silicon sheet growth development for the large area silicon sheet task of the low cost silicon solar array project
[NASA-CR-158732] N79-26979
VARIAN ASSOCIATES, PALO ALTO, CALIF.
An investigation of power suck-out in helix traveling-wave tubes
[AD-A067916] N79-26326
VIRGINIA POLYTECHNIC INST. AND STATE UNIV., BLACKSBURG.
Autonomous attitude estimation via star sensing and pattern recognition
N79-26088
Study of improved modeling and solution procedures for nonlinear analysis
[NASA-CR-158750] N79-26875
VIRGINIA UNIV., CHARLOTTESVILLE.
Tetracarbon metallocarboranes. 7: Cobalt systems derived from [CH3]4C4B8H8. Synthesis and interconversion of 11-, 12-, and 13- vertex nido cages
[AD-A067671] N79-26141
Tetracarbon metallocarboranes. 6: Stereochemical relationships between Co2C4B6 cage isomers formed by oxidative fusion. Crystal structure of [n5-C5h5]2Co2[CH3]4C4B6H6 isomer 5
[AD-A067836] N79-26989
VOUGHT CORP., HAMPTON, VA.
Boeing 747 aircraft with large external pod for transporting outsize cargo
[NASA-CR-159067] N79-26063

W

WASHINGTON STATE DEPT. OF ECOLOGY, OLYMPIA.
Washington state air monitoring data for 1977
[PB-293085/7] N79-26573
WASHINGTON STATE UNIV., PULLMAN.
Determination of trace gases in learjet and U-2 whole air samples collected during the intertropical convergence zone experiment
N79-26722
Intertropical convergence zone ozone profiles from the Learjet ozone analyzer
N79-26723
WASHINGTON UNIV., SEATTLE.
Fresnel zone lens fabricated by electron beam lithography in thin film waveguide
N79-26305
Tearing instability of elastic-plastic crack growth
N79-26419
The intertropical convergence zone experiment: Background and summary
N79-26716
Simultaneous quantum mechanical observations and nonlinear quantum stochastic filter
N79-26877

Switching in optical channel waveguides
N79-26930
WATKINS-JOHNSON CO., PALO ALTO, CALIF.
An investigation of power suck-out in helix traveling-wave tubes
[AD-A067916] N79-26326
WEAPONS SYSTEMS RESEARCH LAB., ADELAIDE (AUSTRALIA).
An attempted extension of a finite element solution to axisymmetric potential flow
[WSRL-0056-TR] N79-26359
WEATHER WING (1ST), HICKAM AFB, HAWAII.
The use of 1WW historical terminal forecast performance tables
[AD-A067093] N79-26731
WESTINGHOUSE ELECTRIC CORP., TRAFFORD, PA.
Development of a process for a high capacity arc heater production of silicon for solar arrays
[NASA-CR-158745] N79-26499
WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER, PITTSBURGH, PA.
Array automated assembly task for the low cost solar array project, phase 2
[NASA-CR-158727] N79-26489
WIEN UNIV. (AUSTRIA).
Weather-caused aviation accidents in the Austrian Alps
N79-26634
Theory of noxious gases diffusion at low inversion
N79-26639
Climatology of thunderstorms and hail in Austria
N79-26706
WISCONSIN UNIV. - MADISON.
Proposal to the United States Energy Research and Development Administration for continuation of fusion reactor technology studies
[COO-4636-1] N79-26511
WOODS HOLE OCEANOGRAPHIC INSTITUTION, MASS.
Fuels from solar energy: Photosynthetic systems: State of the art and potential for energy production
[COO-4151-2] N79-26230

Y

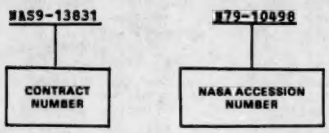
YALE UNIV., NEW HAVEN, CONN.
Stable discrete adaptive control
[AD-A067812] N79-26831
Learning automata: A critique
[S/IS-7703] N79-26843
Spline regression algorithms and local dependence
[AD-A067248] N79-26846
The stability of second order quadratic differential equations, part 2
[AD-A067813] N79-26851
YESHIVA UNIV., NEW YORK, N. Y.
Growth and homogeneity characterization of mercury cadmium telluride crystals
[AD-A067670] N79-26990

Z

ZAGREB UNIV. (YUGOSLAVIA).
The optimal line for turbulent wind oscillations determined from energy spectra
N79-26643
ZENTRALANSTALT FUER METEOROLOGIE UND GEODYNAMIK, VIENNA (AUSTRIA).
Probability of the mean sum of monthly precipitation in the Austrian Alps
N79-26691
ZENTRALANSTALT FUER METEOROLOGIE UND GEODYNAMIK, WIEN (AUSTRIA).
Time-height sections of a frontal system over the Alps
N79-26630
A report on objective weather forecasting methods of the central Institute of Meteorology and Geodynamics, with special consideration of the Model Output Statistics (MOS) method
N79-26636
SO2 immission concentration during calm in central alpine basins (aichfeld-mur basin styria)
N79-26641

CONTRACT NUMBER INDEX

Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number the NASA accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order. The NASA accession number denotes the number by which the citation is identified.

AF PROJ. 1995
N79-26054
AF PROJ. 2301
N79-26028
AF PROJ. 2304
N79-26830
N79-26848
N79-26849
AF PROJ. 2305
N79-26326
AF PROJ. 2307
N79-26029
AF PROJ. 2338
N79-26318
AF PROJ. 2423
N79-26212
AF PROJ. 4519
N79-26829
AF PROJ. 7184
N79-26448
AF PROJ. 7600
N79-26043
AF PROJ. 7663
N79-26595
AF PROJ. 8605
N79-26594
AF PROJ. 9767
N79-26983
AF-AFOSR-0025-79
N79-26852
N79-26870
AF-AFOSR-2714-74
N79-26990
AF-AFOSR-2749-75
N79-26892
AF-AFOSR-2916-76
N79-26060
AF-AFOSR-2948-76
N79-26983
AF-AFOSR-3066-76
N79-26323
AF-AFOSR-3151-77
N79-26849
AF-AFOSR-3281-77
N79-26830
AF-AFOSR-3303-77
N79-26360
AF-AFOSR-3468-77
N79-26026
N79-26027
N79-26028
AF-AFOSR-3489-78
N79-26029
AF-AFOSR-3678-78
N79-26848
AID/TA-C-1148
N79-26456
ARB-A5-041-80
N79-26565
ARB-A6-210-30
N79-26565
ARPA ORDER 1279
N79-26933
ARPA ORDER 1910
N79-26364
ARPA ORDER 2223
N79-26792
ARPA ORDER 2397
N79-26341
N79-26994
ARPA ORDER 2752
N79-26258
ARPA ORDER 3427
N79-26386
ARPA ORDER 3578
N79-26988
AT(11-1)-2533
N79-26521
AT(49-24)-0293
N79-26198
B-EG-99009 N79-26436
CHR-76-00771-07
N79-26406
DA PROJ. 1L1-61102-AH-46
N79-26140
DA PROJ. 1L1-62120-AH-25
N79-26987
DA PROJ. 1L2-63209-D-103
N79-26050
DA PROJ. 1T1-61101-A-91A
N79-26255
DA PROJ. 1T6-65702-D-127
N79-26734
DA PROJ. 1X2-63314-D-093
N79-26394
DA PROJ. 4A1-61102-AT-24
N79-26590
DA PROJ. 4A7-61102-AT-23
N79-26225
DA-ERO-76-G-038
N79-26590
DAAB07-77-C-0158
N79-26264
DAAB07-77-C-2725
N79-26319
DAAG20-77-G-0214
N79-26137
DAAG29-76-C-0020
N79-26592
DAAG29-76-D-0100
N79-26795
DAAG29-76-G-0144
N79-26365
DAAG29-76-G-0238
N79-26868
DAAG29-77-G-0134
N79-26391
DAAG29-78-C-0012
N79-26869
DAAG46-76-C-0035
N79-26214
DAAG53-76-C-0059
N79-26984
DAAK10-78-C-0153
N79-26222
DAAK70-78-C-0120
N79-26328
DACA39-78-M-0053
N79-26815
DABC04-75-G-0193
N79-26391
DABC15-72-C-0308
N79-26792
DARPA ORDER 3466
N79-26984
DASG60-77-C-0110
N79-26376
DGBST-76-7-0117
N79-26993
DI-14-31-0001-3829
N79-27034
DI-14-31-0001-5213
N79-26468
DI-14-31-0001-9076
N79-26458
DI-14-34-001-6006
N79-26466
DI-14-34-001-7011
N79-26466
DI-14-34-001-7012
N79-26466
DI-14-34-001-8006
N79-26466
DI-14-34-0001-6079
N79-26453
DI-14-34-0001-7035
N79-26578
DI-14-34-0001-7060
N79-26457
DI-14-34-0001-8045
N79-27035
DNA001-77-C-0009
N79-26104
DNA001-78-C-0043
N79-26260
DOE-40-550-75
N79-26906
DOT-FA71WAI-242
N79-26041
DOT-FA77WA-4077
N79-26882
DOT-FA78WAI-851
N79-26254
DOT-FH-11-9328
N79-26382
DOT-TSC-RA-75-41
N79-26412
DOT-TSC-RA-77-07
N79-26411
DOT-UT-MY-11-0017
N79-27024
DREE-76/34-203
N79-26336
DSA900-78-C-0447
N79-27016
E(49-26)-1004
N79-26502
E(49-26)-1059
N79-26504
EC-77-A-31-1002
N79-26505
EC-77-A-31-1040
N79-27023
EC-77-A-31-1044
N79-26316
EDA-06-06-01341
N79-27028
EDA-99-06-09572
N79-27026
EE-77-S-02-4347
N79-26145
N79-26547
EG-77-S-02-4151
N79-26230
EG-77-S-02-4339
N79-26522
EG-77-S-02-4577
N79-26525
EPA-CB-6-99-2530-A
N79-26552
EPA-E-804420 N79-27033
EPA-68-01-3896
N79-26568
EPA-68-01-3947
N79-26613
N79-26614
N79-26615
EPA-68-01-3955
N79-26539
EPA-68-02-1010
N79-26575
EPA-68-02-2093
N79-26574
EPA-68-02-2112
N79-26234
N79-26236
EPA-68-02-2131
N79-26581
EPA-68-02-2150
N79-26154
EPA-68-02-2285
N79-26566
EPA-68-02-2447
N79-26561
EPA-68-02-2458
N79-26563
EPA-68-02-2593
N79-26613
N79-26614
N79-26615
EPA-68-02-2594
N79-26572
EPA-68-02-2605
N79-26577
EPA-68-02-2611
N79-26548
EPA-68-02-2612
N79-26551
N79-26555
N79-26564
EPA-68-02-2632
N79-26569
EPA-68-02-2754
N79-26557
EPA-68-03-2449
N79-26237
EPA-68-03-2482
N79-27025
EPA-68-03-2536
N79-26235
EPA-68-10-3169
N79-26554
EPRI PROJ. 905-1-2
N79-26545
EQ9AC001 N79-26449
ER-78-S-02-4894
N79-26897
ERI PROJ. 1204
N79-26060
ET-78-S-02-4636
N79-26511
EX-76-A-01-2295-029
N79-26523
EX-76-A-29-1060
N79-26476
EX-76-C-01-1517
N79-26226
EX-76-C-01-2286
N79-26232
EX-76-C-01-2489
N79-26143
EY-76-C-02-0016
N79-26180
N79-26184
N79-26215
N79-26330
N79-26516
N79-26518
N79-26913
N79-26916
N79-26951
EY-76-C-02-1764
N79-26898
EY-76-C-02-2925
N79-26229
EY-76-C-02-3065
N79-26912
EY-76-C-02-3073
N79-26947
N79-26958
EY-76-C-02-3077
N79-26853
EY-76-C-02-3326
N79-26763

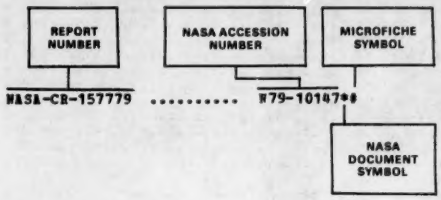
CONTRACT NUMBER INDEX

EY-76-C-03-0167 N79-26185
N79-26515
N79-26946
EY-76-C-03-0515 N79-26905
N79-26914
N79-27019
EY-76-C-03-0822 N79-26181
EY-76-C-04-0613 N79-26151
N79-26186
N79-26333
N79-26398
N79-26405
EY-76-C-04-0789 N79-26146
N79-26183
N79-26332
N79-26512
N79-26528
N79-26530
N79-26906
N79-26909
EY-76-C-06-1830 N79-26911
EY-76-C-06-1857 N79-26395
EY-76-C-07-1570 N79-26526
EY-76-C-14-2170 N79-26818
EY-76-S-02-2171 N79-26895
EY-76-S-02-2218 N79-26957
EY-76-S-02-2383 N79-26817
EY-76-S-02-2482 N79-26416
EY-76-S-02-2533 N79-26521
EY-76-S-02-3027 N79-27001
EY-76-S-02-4069 N79-26918
EY-76-S-03-0034 N79-26958
EY-77-S-02-4191 N79-26149
FAA PROJ. 052-241-04 N79-26041
F04701-77-C-0078 N79-26134
N79-26313
F19628-76-C-0074 N79-26595
F19628-76-C-0185 N79-26594
F19628-77-C-0010 N79-26733
F19628-78-C-0002 N79-26041
N79-26258
N79-26985
F19628-78-C-0008 N79-26043
F19628-78-C-0182 N79-26593
F30602-74-C-0082 N79-26933
F30602-77-C-0004 N79-26318
F30602-77-C-0114 N79-26932
F30602-78-C-0064 N79-26933
F33615-75-C-3109 N79-26177
F33615-76-C-0521 N79-26448
F33615-76-C-2063 N79-26058
F33615-77-C-1032 N79-26390
F33615-77-C-1155 N79-26324
F33615-77-C-1222 N79-26054
F33615-77-C-5141 N79-26212
F33615-77-C-5195 N79-26211
F40600-77-C-0008 N79-26363
F44620-76-C-0023 N79-26227
F49620-77-C-0004 N79-26392
F49620-77-C-0101 N79-26852
N79-26870
F49620-77-C-0102 N79-26326
F49620-78-C-0016 N79-26227
GEORGIA TECH. PROJ. A-1855 N79-26101
N79-26102
HUD-CPA-CA-1050.305 N79-27032
JPL PROJ. 6072.1 N79-26494
JPL-954328 N79-26486
JPL-954339 N79-26977
JPL-954343 N79-26487
JPL-954355 N79-26501
JPL-954373 N79-26981
JPL-954374 N79-26978
N79-26979
JPL-954527 N79-26494
JPL-954589 N79-26499
JPL-954716 N79-26493
JPL-954796 N79-26485
JPL-954816 N79-26314
N79-26315
JPL-954853 N79-26498
JPL-954873 N79-26489
JPL-954882 N79-26497
JPL-954888 N79-26496
JPL-954977 N79-26492
N79-26980
JPL-955055 N79-26490
JPL-955089 N79-26488
N79-26495
JPL-955123 N79-26491
JPL-955170 N79-26785
JPL-955201 N79-26500
KS/1/0648/C.E.43(A)2 N79-26216
NDA903-77-C-0370 N79-27006
NDA903-78-C-0284 N79-26988
NASA ORDER L-60036-A N79-26021
NASA ORDER S-40255-E N79-26441
NAS1-13500 N79-26063
NAS1-14370 N79-26428
NAS1-15153 N79-26046
NAS1-15202 N79-26045
NAS2-6158 N79-26883
NAS2-7262 N79-26062
NAS2-8666 N79-26135
NAS2-8959 N79-26374
NAS2-9663 N79-26014
NAS2-9690 N79-26056
NAS2-9698 N79-26070
NAS2-9896 N79-26067
N79-26068
N79-26069
NAS2-9897 N79-26071
N79-26072
NAS2-10113 N79-26024
NAS3-19709 N79-26120
NAS3-19736 N79-26221
NAS3-19777 N79-26884
N79-26885
N79-26886
NAS3-20110 N79-26101
N79-26102
NAS3-20380 N79-26175
NAS3-20591 N79-26055
NAS3-21184 N79-26384
NAS3-21264 N79-26506
NAS5-23412 N79-26084
NAS7-100 N79-26253
N79-26311
N79-26312
N79-26489
N79-26491
N79-26500
N79-26785
N79-26977
N79-26978
N79-26979
NAS8-13176 N79-27057
NAS8-31459 N79-27057
NAS8-32200 N79-26132
N79-26133
NAS8-32521 N79-26209
NAS8-32657 N79-26136
NAS8-33072 N79-26107
NAS8-33089 N79-26711
NAS9-13176 N79-27057
NAS9-15800 N79-26442
N79-26443
N79-26445
N79-26446
NBS-5-35889 N79-27036
N79-27037
N79-27038
NBS-5-35917 N79-26341
NGL-05-020-176 N79-26942
NGL-33-010-171 N79-26440
NGL-38-002-053 N79-26447
NGR-05-007-337 N79-26811
NGR-14-005-181 N79-26587
NGR-33-022-157 N79-26429
NOAA-04-78-B01-8 N79-26748
NOAA-04-78-B01-11 N79-26741
NOAA-05-06-022-44011 N79-26749
NR PROJ. 049-272 N79-26812
N79-27010
NR PROJ. 053-569 N79-26141
NR PROJ. 356-561 N79-26210
NR PROJ. 359-653 N79-26982
NRC-FIB-A-1192 N79-26906
NRC-02-77-129 N79-26904
N79-26922
N79-26923
N79-26924
N79-26925
N79-26926
N79-26927
NRC-04-77-017 N79-26610
NRC-60-78-254 N79-26409
NSF ATM-75-01424 N79-26743
N79-26751
NSF ATM-76-01773 N79-26588
NSF ATM-77-15369 N79-26609
NSF ATM-78-08440 N79-26942
NSF CA-114 N79-26612
NSF DPP-78-17165 N79-26893
NSF DSI-76-21949 N79-27007
NSF ENG-76-11106 N79-26870
NSF ENG-76-82100 N79-26452
NSF ENV-74-01575 N79-26243
NSF ENV-74-051575 N79-26244
NSF GI-41897 N79-26243
NSF GN-41628 N79-27007
NSF IRT-76-80262 N79-26452
NSF MCS-76-06595 N79-26853
NSF MCS-76-11460 N79-26846
NSF OCD-74-21678 N79-26609
NSF OCE-76-00594 N79-26761
NSF OCE-76-04825 N79-26761
NSF OCE-03381 N79-26761
NSF PRT-77-12873 N79-26958
NSF SRS-77-22770 N79-27020
NSF 08616 N79-26843
NSG-1167 N79-26402
NSG-1474 N79-26881
NSG-1546 N79-26875
NSG-1553 N79-26844
NSG-1569 N79-26065
NSG-1570 N79-26013
NSG-1574 N79-26018
NSG-2262 N79-27044
NSG-3011 N79-26110
NSG-3086 N79-26943
NSG-5154 N79-26094
NSG-5236 N79-27045
NSG-7177 N79-27051
NSG-7268 N79-27049
NSG-7371 N79-27057
NSG-7479 N79-26586
NO1-BV-3-2913 N79-26220
NO1-BV-7-2971 N79-26780
N00014-71-C-0108 N79-26261
N00014-75-C-0302 N79-26261
N00014-75-C-0305 N79-26141
N79-26989
N00014-75-C-0440 N79-27003
N00014-75-C-0462 N79-27010
N79-27011
N79-27012
N79-27013
N79-27015
N00014-75-C-0556 N79-27004
N00014-75-C-0573 N79-26794
N00014-75-C-0671 N79-26894
N00014-75-C-0689 N79-26210
N00014-75-C-0709 N79-26327
N00014-75-C-0796 N79-26393
N00014-76-C-0017 N79-26831
N79-26851
N00014-76-C-0277 N79-26846
N00014-76-C-0351 N79-26510
N00014-76-C-0564 N79-26364
N00014-77-C-0004 N79-26138
N00014-77-C-0362 N79-26265
N00014-77-C-0387 N79-26982
N00014-77-C-0491 N79-26388
N00014-77-C-0546 N79-26432

N00014-77-C-0593
N79-26386
N00014-77-C-0672
N79-26031
N00014-78-C-0159
N79-26847
N00014-78-C-0201
N79-26931
N00014-78-C-0284
N79-26037
N00014-78-C-0417
N79-26986
N00014-78-C-0543
N79-26845
N00014-78-C-0599
N79-26850
N00014-79-C-0227
N79-26755
N00019-76-C-0427
N79-26176
N00019-78-B-0330
N79-26735
N00024-76-C-5352
N79-26059
N00123-76-C-1937
N79-26320
N79-26325
N00600-76-C-1494
N79-26030
N62269-77-C-0347
N79-27014
N62269-77-C-0382
N79-26756
N62269-77-C-0543
N79-26431
OWRT PROJ. B-045-KAN(1)
N79-26453
OWRT PROJ. B-083-IND(10)
N79-26468
PHS-HRA-106-74-182
N79-26778
PROJ. 3235 N79-26185
PROJ. 8985 N79-26143
RF PROJ. 761420/711626
N79-26586
RR0110941 N79-26387
N79-26389
RR0130243 N79-26213
RR0420401 N79-26847
SF43422592 N79-26430
SRI PROJ. PYU-4909
N79-26592
SRI PROJ. 7696
N79-26785
SWED-EPB-7-117/75
N79-26740
SWED-NSRC-G-0223-061
N79-26740
USPS-104230-76-X-1675
N79-26292
USPS-104239-76-X-1675
N79-26291
W-31-109-ENG-38
N79-26178
N79-26434
N79-26519
N79-26520
N79-26529
N79-26546
N79-26896
N79-26908
N79-26915
N79-26919
N79-26953
N79-26960
W-7405-ENG-26
N79-26147
N79-26148
N79-26179
N79-26182
N79-26231
N79-26366
N79-26433
N79-26527
N79-26954
N79-26955
N79-27018
W-7405-ENG-36
N79-26331
N79-26396
N79-26397
N79-26404
N79-26910
N79-26945
W-7405-ENG-48
N79-26121
N79-26142
N79-26150
N79-26377
N79-26514
N79-26524
N79-26544
N79-26907
N79-26948
N79-26949
N79-26950
N79-26956
N79-26958
N79-26959
N79-26991
N79-26998
N79-27000
W-7405-ENG-82
N79-26144
N79-26329
N79-26992
N79-26999
WF14142109 N79-26025
WF41421091 N79-26049
WF52551715 N79-26732
XF11101100 N79-26320
198-10-10 N79-26715
199-71-02 N79-26762
199-73-02 N79-26135
505-02-13-42 N79-26811
505-04-13-02 N79-26022
505-06-11 N79-26067
N79-26068
N79-26069
N79-26071
N79-26072
505-06-21 N79-26014
505-06-43-08 N79-26064
505-07-11 N79-26009
505-09-13-11 N79-26781
N79-26782
505-10-22 N79-26062
505-10-23-04 N79-26881
505-10-23-05 N79-26015
505-11-23-03 N79-26023
506-17-23-03 N79-26427
516-58-21 N79-26017
517-53-43-02 N79-26020
769-02-01 N79-26035
791-40-13-01 N79-26063
920-20-00-00-72
N79-27057

REPORT / ACCESSION NUMBER INDEX

Typical Report/Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The NASA accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche.

A-7780 ..... N79-26715*#
A-7824 ..... N79-26762*#
A-7841 ..... N79-26014*#
A-7860 ..... N79-26009*#
A-7861 ..... N79-26035*#
A-7876 ..... N79-26017*#

AC-40 ..... N79-26740 #

AD-A058571 ..... N79-26134 #
AD-A064109 ..... N79-26401 #
AD-A065641 ..... N79-26783 #
AD-A066130 ..... N79-26255 #
AD-A066131 ..... N79-26104 #
AD-A066148 ..... N79-26386 #
AD-A066174 ..... N79-26389 #
AD-A066177 ..... N79-26387 #
AD-A066188 ..... N79-26982 #
AD-A066246 ..... N79-26430 #
AD-A066256 ..... N79-26256 #
AD-A066321 ..... N79-26388 #
AD-A066886 ..... N79-26987 #
AD-A066902 ..... N79-26390 #
AD-A066904 ..... N79-26054 #
AD-A066918 ..... N79-26984 #
AD-A066923 ..... N79-26944 #
AD-A066925 ..... N79-26363 #
AD-A066926 ..... N79-26845 #
AD-A066932 ..... N79-27004 #
AD-A066935 ..... N79-26590 #
AD-A066936 ..... N79-26589 #
AD-A066942 ..... N79-26223 #
AD-A066972 ..... N79-26210 #
AD-A066973 ..... N79-26222 #
AD-A066977 ..... N79-26260 #
AD-A066979 ..... N79-26893 #
AD-A066992 ..... N79-26812 #
AD-A066993 ..... N79-27010 #
AD-A066994 ..... N79-27011 #
AD-A067015 ..... N79-27012 #
AD-A067023 ..... N79-26887 #
AD-A067066 ..... N79-26983 #
AD-A067068 ..... N79-26892 #
AD-A067072 ..... N79-26257 #
AD-A067080 ..... N79-26036 #
AD-A067084 ..... N79-26362 #
AD-A067093 ..... N79-26731 #
AD-A067103 ..... N79-26258 #
AD-A067122 ..... N79-26025 #
AD-A067123 ..... N79-26792 #
AD-A067124 ..... N79-26038 #
AD-A067147 ..... N79-27015 #
AD-A067148 ..... N79-26259 #
AD-A067164 ..... N79-26985 #
AD-A067165 ..... N79-26510 #
AD-A067166 ..... N79-26448 #
AD-A067168 ..... N79-27013 #
AD-A067173 ..... N79-26986 #
AD-A067174 ..... N79-26037 #
AD-A067175 ..... N79-27014 #
AD-A067178 ..... N79-26319 #
AD-A067183 ..... N79-26988 #
AD-A067185 ..... N79-26211 #
AD-A067186 ..... N79-26592 #
AD-A067187 ..... N79-26868 #
AD-A067213 ..... N79-26320 #
AD-A067224 ..... N79-26318 #
AD-A067227 ..... N79-26391 #
AD-A067233 ..... N79-26073 #
AD-A067246 ..... N79-27003 #
AD-A067248 ..... N79-26846 #
AD-A067259 ..... N79-26754 #
AD-A067265 ..... N79-26828 #
AD-A067274 ..... N79-26137 #
AD-A067277 ..... N79-26058 #
AD-A067279 ..... N79-26847 #
AD-A067307 ..... N79-26254 #
AD-A067324 ..... N79-26867 #
AD-A067336 ..... N79-26317 #
AD-A067348 ..... N79-26591 #
AD-A067402 ..... N79-26816 #
AD-A067403 ..... N79-26061 #
AD-A067511 ..... N79-26322 #
AD-A067516 ..... N79-26375 #
AD-A067536 ..... N79-26261 #
AD-A067538 ..... N79-26829 #
AD-A067545 ..... N79-26848 #
AD-A067566 ..... N79-26431 #
AD-A067588 ..... N79-26016*#
AD-A067598 ..... N79-26830 #
AD-A067623 ..... N79-26365 #
AD-A067629 ..... N79-26313 #
AD-A067645 ..... N79-26735 #
AD-A067649 ..... N79-26227 #
AD-A067661 ..... N79-26870 #
AD-A067662 ..... N79-26796 #
AD-A067665 ..... N79-26732 #
AD-A067667 ..... N79-26321 #
AD-A067668 ..... N79-26786 #
AD-A067670 ..... N79-26990 #
AD-A067671 ..... N79-26141 #
AD-A067672 ..... N79-26265 #
AD-A067675 ..... N79-26734 #
AD-A067709 ..... N79-26224 #
AD-A067710 ..... N79-26594 #
AD-A067711 ..... N79-26595 #
AD-A067712 ..... N79-26849 #
AD-A067731 ..... N79-26756 #
AD-A067732 ..... N79-26214 #
AD-A067736 ..... N79-26213 #
AD-A067737 ..... N79-26050 #
AD-A067742 ..... N79-26049 #
AD-A067744 ..... N79-26795 #
AD-A067745 ..... N79-26212 #
AD-A067746 ..... N79-26794 #
AD-A067757 ..... N79-26047 #
AD-A067768 ..... N79-26850 #
AD-A067782 ..... N79-26138 #
AD-A067785 ..... N79-26176 #
AD-A067786 ..... N79-26324 #
AD-A067787 ..... N79-26323 #
AD-A067789 ..... N79-26931 #
AD-A067795 ..... N79-26364 #
AD-A067799 ..... N79-26813 #
AD-A067812 ..... N79-26831 #
AD-A067813 ..... N79-26851 #
AD-A067824 ..... N79-26793 #
AD-A067827 ..... N79-26596 #
AD-A067829 ..... N79-26225 #
AD-A067830 ..... N79-26139 #
AD-A067834 ..... N79-26852 #
AD-A067836 ..... N79-26989 #
AD-A067843 ..... N79-26597 #
AD-A067845 ..... N79-26140 #
AD-A067848 ..... N79-26894 #
AD-A067854 ..... N79-26392 #
AD-A067855 ..... N79-26393 #

AD-A067880 ..... N79-26328 #
AD-A067885 ..... N79-26933 #
AD-A067905 ..... N79-26042 #
AD-A067913 ..... N79-26030 #
AD-A067914 ..... N79-26376 #
AD-A067916 ..... N79-26326 #
AD-A067924 ..... N79-26074 #
AD-A067927 ..... N79-26031 #
AD-A067937 ..... N79-26733 #
AD-A067938 ..... N79-26043 #
AD-A067941 ..... N79-26593 #
AD-A067944 ..... N79-26041 #
AD-A067948 ..... N79-26264 #
AD-A067950 ..... N79-26029 #
AD-A067969 ..... N79-26060 #
AD-A067970 ..... N79-26059 #
AD-A067974 ..... N79-27016 #
AD-A067976 ..... N79-26815 #
AD-A067977 ..... N79-26325 #
AD-A067980 ..... N79-26327 #
AD-A067981 ..... N79-26048 #
AD-A067983 ..... N79-26773 #
AD-A067993 ..... N79-26882 #
AD-A067997 ..... N79-26177 #
AD-A067998 ..... N79-27006 #
AD-A068000 ..... N79-26432 #
AD-A068001 ..... N79-26755 #
AD-A068002 ..... N79-26028 #
AD-A068003 ..... N79-26026 #
AD-A068004 ..... N79-26027 #
AD-A068005 ..... N79-26932 #
AD-A068008 ..... N79-26869 #
AD-A068012 ..... N79-27005 #
AD-A068015 ..... N79-26394 #
AD-A068017 ..... N79-26888 #
AD-A068018 ..... N79-26262 #
AD-A068019 ..... N79-26263 #
AD-A068021 ..... N79-27017 #
AD-A068023 ..... N79-26814 #
AD-A068026 ..... N79-26039 #
AD-A068040 ..... N79-26598 #

AD-E000269 ..... N79-26387 #
AD-E000274 ..... N79-26389 #
AD-E000277 ..... N79-26944 #
AD-E000286 ..... N79-26732 #
AD-E000464 ..... N79-26104 #
AD-E300473 ..... N79-26260 #
AD-E400262 ..... N79-26401 #
AD-E400292 ..... N79-26222 #
AD-E400295 ..... N79-26223 #
AD-E430191 ..... N79-26255 #

AED-CONF-78-212-008 ..... N79-26513 #
AED-CONF-78-212-013 ..... N79-26517 #

AEDC-TR-78-43 ..... N79-26362 #
AEDC-TR-79-4 ..... N79-26363 #
AEDC-TR-79-7 ..... N79-26061 #

AERO-1257-VOL-2 ..... N79-26025 #

AERONOMY-85 ..... N79-26587*#
AERONOMY-87 ..... N79-26588 #

AFAL-TR-78-117 ..... N79-26390 #
AFAL-TR-78-143 ..... N79-26054 #
AFAL-TR-78-160 ..... N79-26324 #
AFAL-TR-79-1022 ..... N79-26828 #

AFAPL-TR-78-31 ..... N79-26058 #
AFAPL-TR-79-2014 ..... N79-26224 #

AFETO-TR-8-78 ..... N79-26039 #

AFFDL-TR-78-186 ..... N79-26177 #

AFGL-ERP-653 ..... N79-26597 #

AFGL-TR-78-0269-PT-1 ..... N79-26595 #
AFGL-TR-78-0285 ..... N79-26043 #
AFGL-TR-79-0009 ..... N79-26594 #
AFGL-TR-79-0015-PT-3 ..... N79-26597 #
AFGL-TR-79-0047 ..... N79-26733 #
AFGL-TR-79-0067 ..... N79-26593 #

AFHRL-TR-78-67 ..... N79-26783 #

AFNL-TR-78-144 ..... N79-26212 #

AFNL-TR-78-186 ..... N79-26211 #

AFOSR-79-0279TR ..... N79-26983 #
AFOSR-79-0340TR ..... N79-26892 #
AFOSR-79-0392TR ..... N79-26326 #
AFOSR-79-0429TR ..... N79-26848 #
AFOSR-79-0431TR ..... N79-26323 #
AFOSR-79-0435TR ..... N79-26227 #
AFOSR-79-0445TR ..... N79-26830 #
AFOSR-79-0446TR ..... N79-26849 #
AFOSR-79-0448TR ..... N79-26392 #
AFOSR-79-0452TR ..... N79-26990 #
AFOSR-79-0453TR ..... N79-26852 #
AFOSR-79-0454TR ..... N79-26870 #
AFOSR-79-0473TR ..... N79-26028 #
AFOSR-79-0474TR ..... N79-26026 #
AFOSR-79-0475TR ..... N79-26027 #
AFOSR-79-0476TR ..... N79-26029 #
AFOSR-79-0509TR ..... N79-26060 #

AIRESEARCH-76-212188(9) ..... N79-26059 #
AIRESEARCH-76-212199(21) ..... N79-26058 #

AMERC-TR-78-43 ..... N79-26214 #
AMERC-TR-79-20 ..... N79-27016 #

AMRL-TR-78-117 ..... N79-26448 #

ANL-HEP-CP-78-48 ..... N79-26915 #

ANL-K-78-4190-2 ..... N79-26908 #
ANL-K-78-4238-1-VOL-4 ..... N79-26919 #

ANL/EES-TM-29 ..... N79-26520 #
ANL/PPP-78-2 ..... N79-26953 #
ANL/RHD-78-4 ..... N79-26519 #

AR-B-A6-210-30-78-91 ..... N79-26565 #

AR-1 ..... N79-26213 #
AR-6 ..... N79-26489*#
AR-15 ..... N79-27016 #
AR-34 ..... N79-27061 #
AR-001-325 ..... N79-26053 #
AR-001-422 ..... N79-26359 #

ARBRL-TR-02131 ..... N79-26255 #

ARL/AERO-NOTE-378 ..... N79-26073 #
ARL/SYS-NOTE-60 ..... N79-26053 #

ARLCD-CR-78027 ..... N79-26222 #

ARLCD-TR-78077 ..... N79-26223 #

ARRID-TR-78001 ..... N79-26401 #

ARO-D33 ..... N79-26868 #

ARO-13095.3-P ..... N79-26391 #
ARO-13635.5-PX ..... N79-26592 #
ARO-13675.2-EX ..... N79-26365 #
ARO-13888.17-MX ..... N79-26868 #
ARO-15084.1-E ..... N79-26869 #
ARO-15108.1-C ..... N79-26137 #

AS-PAPER-291 ..... N79-26609 #
AS-PAPER-297 ..... N79-26743 #
AS-PAPER-298 ..... N79-26751 #

ASEL-TR-174-7 ..... N79-26062*#

ATC-83-VOL-2 ..... N79-26041 #

ATR-78(7623-03)-1 ..... N79-27025 #

AUWE-TN-580/78 ..... N79-26196 #

BATT-G-6496 ..... N79-26431 #

BDX-613-1848-REV ..... N79-26398 #
BDX-613-1867-REV ..... N79-26151 #
BDX-613-1868-REV ..... N79-26333 #
BDX-613-1908-REV ..... N79-26405 #
BDX-613-1993-REV ..... N79-26186 #

BERC/OP-78/21 ..... N79-26411 #

BR-BI-8330 ..... N79-26200 #

BNI-2018 ..... N79-26198 #

BNL-NUREG-25325 ..... N79-26180 #

BNL-24782 ..... N79-26951 #
BNL-24909 ..... N79-26916 #
BNL-24949 ..... N79-26330 #
BNL-24957 ..... N79-26184 #
BNL-25023 ..... N79-26913 #
BNL-25215 ..... N79-26516 #
BNL-25263 ..... N79-26518 #
BNL-50886 ..... N79-26215 #

BR59769 ..... N79-26798 #
BR61816 ..... N79-26040 #
BR62469 ..... N79-26218 #
BR62897 ..... N79-26109 #
BR63423 ..... N79-26193 #
BR64928 ..... N79-26797 #
BR64930 ..... N79-26407 #
BR64934 ..... N79-26279 #
BR65142 ..... N79-26379 #
BR65357 ..... N79-26832 #
BR65483 ..... N79-26196 #
BR65548 ..... N79-26825 #
BR65610 ..... N79-26112 #
BR65872 ..... N79-26106 #
BR66315 ..... N79-26216 #
BR66515 ..... N79-26174 #
BR66721 ..... N79-26195 #
BR77110 ..... N79-26871 #
BR77140 ..... N79-26378 #

C-921-VOL-2 ..... N79-26572 #

CAEC-28 ..... N79-26233 #

CAES-9 ..... N79-26523 #

CALSPAN-6283-M-1 ..... N79-26037 #

CALT-822-104 ..... N79-26181 #

CERL-E-4 ..... N79-26847 #

CERL-TR-E-149 ..... N79-26225 #

CN-ISSN-0082-5255 ..... N79-26360 #
CN-ISSN-0082-5263 ..... N79-26373 #

COMPLETION-88 ..... N79-26466 #

CONF-780114-4 ..... N79-26512 #
CONF-780425-9 ..... N79-26517 #
CONF-780481-3 ..... N79-26547 #
CONF-780619-24 ..... N79-26525 #
CONF-780650-8 ..... N79-26416 #
CONF-780763-1 ..... N79-26955 #
CONF-780801-40 ..... N79-26524 #
CONF-780826-18 ..... N79-26898 #
CONF-780826-23 ..... N79-26912 #
CONF-780851-3 ..... N79-26951 #
CONF-780851-4 ..... N79-26178 #
CONF-780858-9 ..... N79-26818 #
CONF-780952-21 ..... N79-26947 #
CONF-780952-30 ..... N79-26331 #
CONF-780952-32 ..... N79-26184 #
CONF-780952-42 ..... N79-26330 #
CONF-780952-45 ..... N79-26905 #
CONF-780953-9 ..... N79-26957 #
CONF-780979-1 ..... N79-26913 #
CONF-780982-1 ..... N79-26396 #
CONF-780988-5 ..... N79-26916 #
CONF-780991-1 ..... N79-26895 #
CONF-781029-8 ..... N79-26950 #
CONF-781033-21 ..... N79-26956 #
CONF-781033-34 ..... N79-26544 #
CONF-781039-9 ..... N79-26147 #
CONF-781055-4 ..... N79-26960 #
CONF-781095-5 ..... N79-26915 #
CONF-781109-18 ..... N79-26546 #
CONF-781110-15 ..... N79-26232 #
CONF-781113-2 ..... N79-26185 #
CONF-781113-31 ..... N79-26896 #
CONF-781142-2 ..... N79-26516 #
CONF-781142-7 ..... N79-26529 #
CONF-781144-16 ..... N79-26180 #
CONF-781146-9 ..... N79-26366 #
CONF-781150-4 ..... N79-26231 #
CONF-781150-5 ..... N79-26148 #
CONF-781159-4 ..... N79-27019 #
CONF-781172-1 ..... N79-26182 #
CONF-781202-25 ..... N79-26434 #
CONF-781239 ..... N79-26514 #
CONF-789115-1 ..... N79-27000 #
CONF-790102-4 ..... N79-26515 #
CONF-790125-7 ..... N79-26945 #
CONF-790129-1 ..... N79-26397 #
CONF-790207-2 ..... N79-26377 #
CONF-790216-2 ..... N79-26150 #
CONF-7804108-4 ..... N79-26513 #
CONF-7806109-2 ..... N79-26543 #
CONF-7810128-2 ..... N79-26404 #
CONF-7810129-1 ..... N79-26998 #
CONF-7811109-4 ..... N79-26527 #

CONS/2925-3 ..... N79-26229 #

CONTRIB-198 ..... N79-26453 #
CONTRIB-207 ..... N79-26578 #

COO-1764-337 ..... N79-26898 #
COO-2171-184 ..... N79-26895 #
COO-2218-123 ..... N79-26957 #
COO-2383-51 ..... N79-26817 #
COO-2482-8 ..... N79-26416 #
COO-2533-10 ..... N79-26521 #
COO-3027-37 ..... N79-27001 #
COO-3065-210 ..... N79-26912 #
COO-3077-155 ..... N79-26853 #
COO-3326-70 ..... N79-26763 #
COO-4069-1 ..... N79-26918 #
COO-4151-2 ..... N79-26230 #
COO-4191-1 ..... N79-26149 #
COO-4339-4 ..... N79-26522 #
COO-4347-1 ..... N79-26185 #
COO-4347-4 ..... N79-26547 #
COO-4577-3 ..... N79-26525 #
COO-4636-1 ..... N79-26511 #
COO-4694-1 ..... N79-26897 #

CORADCOM-76-0100-F ..... N79-26795 #
CORADCOM-77-0158-F ..... N79-26264 #

CRREL-79-1 ..... N79-26590 #
CRREL-79-2 ..... N79-26589 #
CRREL-79-3 ..... N79-26893 #

CTH-78.02-R ..... N79-26860 #
CTH-78.03-R ..... N79-26861 #

CVAP-TR-78-019 ..... N79-26526 #

C78-972/501 ..... N79-26212 #

DEL-SG-14-78 ..... N79-26760 #
DEL-SG-15-78 ..... N79-26757 #

DELET-TR-77-2725-F ..... N79-26319 #

DHEW/PUB/PHS-79/3210 ..... N79-26778 #

DNA-4422T-3 ..... N79-26260 #
DNA-4630T ..... N79-26104 #

DOC-79SDS4218 ..... N79-26506*#

DOE-78/7 ..... N79-26573 #

DOE/ER-0018 ..... N79-26952 #
DOE/ET-0054 ..... N79-26917 #
DOE/FERC-0008 ..... N79-26228 #
DOE/JPL-954328-79/12 ..... N79-26486*#
DOE/JPL-954339-79/14 ..... N79-26977*#
DOE/JPL-954343-79/15 ..... N79-26487*#
DOE/JPL-954355-79/1 ..... N79-26501*#
DOE/JPL-954373-79/10 ..... N79-26981*#
DOE/JPL-954374-78/1 ..... N79-26979*#
DOE/JPL-954374-78/8 ..... N79-26978*#
DOE/JPL-954527-79/10 ..... N79-26494*#
DOE/JPL-954589-78/8 ..... N79-26499*#
DOE/JPL-954716-79/1 ..... N79-26493*#
DOE/JPL-954796-78/4 ..... N79-26485*#
DOE/JPL-954853-79/2 ..... N79-26498*#
DOE/JPL-954882-79/15 ..... N79-26497*#
DOE/JPL-954888-79/6 ..... N79-26496*#
DOE/JPL-954977-78/1 ..... N79-26492*#

DOE/JPL-954977-79/4 ..... N79-26980*#
DOE/JPL-955055-78/1 ..... N79-26490*#
DOE/JPL-955089-79/3 ..... N79-26495*#
DOE/JPL-955089-79/4 ..... N79-26488*#
DOE/JPL-955123-79/1 ..... N79-26491*#
DOE/JPL-955201-79/3 ..... N79-26500*#
DOE/NASA/1002-79/4 ..... N79-26505*#
DOE/NASA/1004-79/16 ..... N79-26502*#
DOE/NASA/1040-79/6 ..... N79-27023*#
DOE/NASA/1044-79/2 ..... N79-26316*#
DOE/NASA/1059-79/2 ..... N79-26508*#
DOE/NASA/1060-78/1 ..... N79-26476*#
DOE/NASA/20485-79/2 ..... N79-26503*#

DOT-HS-803-808 ..... N79-26412 #
DOT-HS-803-831 ..... N79-26411 #

DOT-TSC-FAA-78-28 ..... N79-26016*#

DOT-TSC-NHTSA-19-15 ..... N79-26412 #
DOT-TSC-NHTSA-79-2 ..... N79-26411 #

DR-NAT-210 ..... N79-26216 #

DRCPM-HEL-79-2 ..... N79-26394 #

DRDMI-T-79-1 ..... N79-26375 #

DRIC-TRANS-5462 ..... N79-26195 #

DTNSRDC-79/002 ..... N79-26025 #
DTNSRDC-79/023 ..... N79-26430 #

DTNSRDC/ASED-78/07 ..... N79-26049 #

D6139 ..... N79-26209*#
D7605-927002 ..... N79-26045*#

E-023 ..... N79-26503*#
E-039 ..... N79-26504*#
E-053 ..... N79-26505*#
E-9419 ..... N79-26502*#
E-9822 ..... N79-26476*#
E-9927 ..... N79-27023*#
E-9999 ..... N79-26019*#

ECOM-DR-986 ..... N79-26734 #

ECR-79-PT-1 ..... N79-26268 #
ECR-80-PT-2 ..... N79-26269 #
ECR-83 ..... N79-26334 #
ECR-84 ..... N79-26435 #

EDA-79-027 ..... N79-27026 #
EDA-79-029 ..... N79-27028 #

EF78-68A-VOL-1 ..... N79-26613 #
EF78-68B-VOL-2 ..... N79-26614 #
EF78-68C-VOL-3 ..... N79-26615 #

EG/G-TR-D370-0001 ..... N79-26755 #

EPA-450/3-78-014B ..... N79-26572 #
EPA-450/3-78-110A-VOL-1 ..... N79-26613 #
EPA-450/3-78-110B-VOL-2 ..... N79-26614 #
EPA-450/3-78-110C-VOL-3 ..... N79-26615 #
EPA-520/2-77-008 ..... N79-26779 #
EPA-560/2-79-002 ..... N79-26568 #
EPA-600/1-79-009 ..... N79-27033 #
EPA-600/2-79-001 ..... N79-26235 #
EPA-600/2-79-032 ..... N79-26561 #
EPA-600/2-79-041 ..... N79-26563 #
EPA-600/3-78-101 ..... N79-26768 #
EPA-600/3-79-010 ..... N79-26580 #
EPA-600/3-79-015 ..... N79-26467 #
EPA-600/3-79-016 ..... N79-26571 #
EPA-600/3-79-018 ..... N79-26579 #
EPA-600/4-78-059 ..... N79-26570 #
EPA-600/4-79-004 ..... N79-26574 #
EPA-600/4-79-006 ..... N79-26153 #
EPA-600/4-79-009 ..... N79-26611 #
EPA-600/4-79-010 ..... N79-26557 #
EPA-600/4-79-013 ..... N79-26566 #
EPA-600/7-78-228 ..... N79-26552 #
EPA-600/7-79-025A ..... N79-26234 #
EPA-600/7-79-025B-VOL-4 ..... N79-26236 #
EPA-600/7-79-026 ..... N79-26577 #
EPA-600/7-79-032 ..... N79-26564 #
EPA-600/7-79-038 ..... N79-26548 #

EPA-600/7-79-039 ..... N79-26237 #
EPA-600/7-79-045 ..... N79-26551 #
EPA-600/7-79-046 ..... N79-26575 #
EPA-600/7-79-047 ..... N79-26154 #
EPA-600/7-79-048 ..... N79-26569 #
EPA-600/7-79-052 ..... N79-26555 #
EPA-600/7-79-065 ..... N79-26581 #
EPA-600/8-79-007 ..... N79-26558 #
EPA-600/9-79-010 ..... N79-27031 #
EPA-902/2-79-001 ..... N79-26553 #

EPRI-FP-953 ..... N79-26545 #

EPRI-NP-719-SR ..... N79-26415 #

ERIM-111800-1-F ..... N79-26456 #

ESD-TR-78-395 ..... N79-26258 #
ESD-TR-78-397 ..... N79-26985 #

ESDU-78043 ..... N79-26421

EWR-79/1 ..... N79-26452 #

E79-10211 ..... N79-26440*#
E79-10214 ..... N79-26441*#
E79-10215 ..... N79-26442*#
E79-10216 ..... N79-26443*#
E79-10217 ..... N79-26444*#
E79-10218 ..... N79-26445*#
E79-10219 ..... N79-26446*#
E79-10220 ..... N79-26447*#

FAA-AM-78-41 ..... N79-26784 #
FAA-AM-79-1 ..... N79-26773 #

FAA-EM-78-19-1-VOL-1 ..... N79-26042 #

FAA-RD-78-33 ..... N79-26041 #
FAA-RD-78-146 ..... N79-26016*#
FAA-RD-79-1 ..... N79-26882 #
FAA-RD-79-22 ..... N79-26254 #

FB-28 ..... N79-26787 #

FCR-79-1 ..... N79-26745 #

FE-1517-67 ..... N79-26226 #
FE-2489-30 ..... N79-26143 #

FHWA/IL/PR-80 ..... N79-26242 #
FHWA/ND/R-78/11 ..... N79-26241 #
FHWA/RD-78-203 ..... N79-26382 #
FHWA/RD-79-S0815-PT-1 ..... N79-26245 #
FHWA/RD-79-S0816 ..... N79-26246 #

FLOW-RR-95 ..... N79-26364 #

FOA-C-10077-H3(E5) ..... N79-26823 #

FR79-76-870 ..... N79-26315*#
FR79-76-871 ..... N79-26314*#

FSGTR-FPL-17 ..... N79-27017 #

FSU-STATISTICS-M486 ..... N79-26848 #
FSU-STATISTICS-M497 ..... N79-26868 #

FUB-1-1978 ..... N79-26274 #
FUB-2-1978 ..... N79-26340 #
FUB-3-1978 ..... N79-26281 #
FUB-4-1978 ..... N79-26282 #
FUB-5-1978 ..... N79-26821 #
FUB-6-1978 ..... N79-26934 #
FUB-7-1978 ..... N79-26283 #
FUB-8-1978 ..... N79-26284 #
FUB-10-1978 ..... N79-26285 #
FUB-11-1978 ..... N79-26286 #
FUB-12-1977 ..... N79-26858 #
FUB-14-1978 ..... N79-26935 #
FUB-16-1978 ..... N79-26936 #
FUB-17-1978 ..... N79-26287 #
FUB-18-1978 ..... N79-26550 #
FUB-26-1977 ..... N79-26337 #
FUB-27-1977 ..... N79-26859 #
FUB-30-1977 ..... N79-26270 #
FUB-31-1977 ..... N79-26338 #
FUB-32-1977 ..... N79-26739 #
FUB-34-1977 ..... N79-26819 #

PUB-35-1977 ..... N79-26271 #
PUB-36-1977 ..... N79-26272 #
PUB-39-1977 ..... N79-26273 #

P78-16 ..... N79-26264 #

G-7813 ..... N79-26082*#

GA-A-14742 ..... N79-26946 #
GA-A-15124 ..... N79-26185 #
GA-A-15184 ..... N79-26515 #

GCA-TR-78-34-G ..... N79-26569 #

GE77THP-33-VOL-3 ..... N79-26260 #
GE77THP-52 ..... N79-26237 #

GPO-24-112 ..... N79-26507 #
GPO-31-606 ..... N79-26730 #
GPO-32-715 ..... N79-27009 #
GPO-36-956 ..... N79-26509 #
GPO-42-886 ..... N79-26508 #

H-1061 ..... N79-26057*#

HAC-REP-E0963 ..... N79-26315*#

HDL-TR-1875 ..... N79-26140 #
HDL-TR-1879 ..... N79-26987 #

HDV-78-08 ..... N79-26567 #
HDV-78-09 ..... N79-26410 #

HEDL-SA-1616-FP ..... N79-26818 #

HEDL-THE-78-102 ..... N79-26409 #

HEL-TH-2-79 ..... N79-26786 #

HTKK-MAT-A120/1978 ..... N79-26855 #

IAP-PAPER-78/A26 ..... N79-26108 #

IC-AERO-78-105 ..... N79-26032 #

ILLDOE-78/11 ..... N79-26540 #

ILR-21 ..... N79-26111 #

INHR43-PR7-78 ..... N79-26538 #

IPF-77-7 ..... N79-26961 #

IRI-133-77-02 ..... N79-26764 #
IRI-133-77-04 ..... N79-26774 #
IRI-133-78-02 ..... N79-26775 #

IS-T-815 ..... N79-26144 #
IS-T-824 ..... N79-26999 #
IS-T-831 ..... N79-26992 #

IS-4596 ..... N79-26329 #

ISBN-3-7983-05090-0 ..... N79-26111 #
ISBN-87-7478-128-6 ..... N79-26604 #
ISBN-87-7478-129-4 ..... N79-26605 #
ISBN-87-7478-130-8 ..... N79-26606 #
ISBN-87-7478-131-6 ..... N79-26601 #
ISBN-87-7478-132-4 ..... N79-26602 #
ISBN-87-7478-133-2 ..... N79-26603 #
ISBN-87-7478-149-9 ..... N79-26607 #
ISBN-87-7478-150-2 ..... N79-26608 #
ISBN-951-697-105-9 ..... N79-26712 #
ISBN-951-697-106-7 ..... N79-26713 #
ISBN-951-697-109-1 ..... N79-26714 #
ISBN-951-751-243-0 ..... N79-26855 #
ISBN-85679-248-9 ..... N79-26421

ISE-TR-79-1-PT-1/2 ..... N79-26869 #

ISI/SR-79-18 ..... N79-26792 #

ISS-P-78/8 ..... N79-26899 #
ISS-P-78/10 ..... N79-26900 #
ISS-P-78/11 ..... N79-26901 #
ISS-P-78/12 ..... N79-26921 #
ISS-P-78/14 ..... N79-26902 #

ISS-R-78/4 ..... N79-26889 #

ISS-T-77/4 ..... N79-26276 #
ISS-T-78/5 ..... N79-26920 #

ISSN-0067-0340 ..... N79-26609 #
ISSN-0067-0340 ..... N79-26743 #
ISSN-0077-5606 ..... N79-26172 #
ISSN-0077-5606 ..... N79-26173 #
ISSN-0140-9751 ..... N79-26010 #
ISSN-0140-9751 ..... N79-26066 #
ISSN-0141-4089 ..... N79-26421
ISSN-0309-099X ..... N79-27046 #
ISSN-0355-1733 ..... N79-26714 #
ISSN-0568-0581 ..... N79-26587*#
ISSN-0568-0581 ..... N79-26588 #

ISU-ERI-AMES-79037 ..... N79-26060 #

ISWS/RI-88/78 ..... N79-26752 #

JPL-PUB-78-21 ..... N79-26412 #

JPL-9950-100 ..... N79-26491*#
JPL-9950-109 ..... N79-26496*#
JPL-9950-110 ..... N79-26497*#
JPL-9950-112 ..... N79-26499*#
JPL-9950-114 ..... N79-26500*#
JPL-9950-115 ..... N79-26501*#

JPRS-73663 ..... N79-27064 #

JSC-14547 ..... N79-26443*#
JSC-14657 ..... N79-26445*#
JSC-14700 ..... N79-26444*#
JSC-14815 ..... N79-26442*#
JSC-14825 ..... N79-26446*#

KAWASAKI-STEEL-TR-6 ..... N79-26199 #

KGI-77-2 ..... N79-27058 #

KNMI-WR-78-1 ..... N79-26738 #
KNMI-WR-78-8 ..... N79-26737 #

KU-FRL-399-1 ..... N79-26018*#

KWI-78-1 ..... N79-26266 #

L-12632 ..... N79-26023*#
L-12784 ..... N79-26020*#
L-12810 ..... N79-26022*#

LA-UR-78-2481 ..... N79-26331 #
LA-UR-78-2607 ..... N79-26396 #
LA-UR-78-3252 ..... N79-26404 #
LA-UR-79-9 ..... N79-26397 #
LA-UR-79-76 ..... N79-26945 #

LA-7651-PR ..... N79-26910 #

LBL-7986 ..... N79-26548 #
LBL-8166 ..... N79-26959 #
LBL-8294 ..... N79-26142 #
LBL-8419 ..... N79-26998 #

LC-79-600002 ..... N79-26994 #
LC-79-600036 ..... N79-26799 #

LCBS-10 ..... N79-26462 #
LCBS-14 ..... N79-26461 #
LCBS-17 ..... N79-26460 #
LCBS-18 ..... N79-26459 #
LCBS-19 ..... N79-26576 #
LCBS-25 ..... N79-26463 #
LCBS-26 ..... N79-26464 #

LCR-489-315 ..... N79-26336 #

LEC-12180 ..... N79-26443*#
LEC-12892 ..... N79-26442*#
LEC-13000 ..... N79-26445*#
LEC-13189 ..... N79-26446*#

LIDS-PR-895 ..... N79-26830 #

LIDS-TR-916 ..... N79-26844*#

LRI-AP714 ..... N79-27006 #

LASC-EREC-TR-0568 ..... N79-26374*#

LOG-J-10741 ..... N79-26012 #

LPS-78-5 ..... N79-27050 #
LPS-78-7 ..... N79-27053*#
LPS-78-10 ..... N79-26280 #
LPS-78-11 ..... N79-26339 #

LR-28667 ..... N79-26050 #

LSI-ER-258-7 ..... N79-26135*#

MB-R-79/06 ..... N79-26497*#

MCR-78-581 ..... N79-26428*#

MDC-A5704 ..... N79-26056*#

MDC-E2000-VOL-1 ..... N79-26132*#
MDC-E2000-VOL-2 ..... N79-26133*#

MDC-G7823 ..... N79-26031 #

MIT-TR-204 ..... N79-26594 #

MN-MONO-102 ..... N79-26619
MN-MONO-105 ..... N79-26620
MN-MONO-107 ..... N79-26621
MN-MONO-108 ..... N79-26622

MQAD-R-264 ..... N79-26218 #

MRC-M-348 ..... N79-26104 #

MRI-269 ..... N79-26492*#
MRI-269 ..... N79-26980*#

MSNW-79-1087/1090-1 ..... N79-26384*#

MTR-7581 ..... N79-26778 #

MTS-HWL-4116-776 ..... N79-26429*#

NA-78-917 ..... N79-26176 #

NADC-77250-30 ..... N79-26431 #
NADC-78213-60 ..... N79-26038 #
NADC-78225-60 ..... N79-26036 #
NADC-78226-30 ..... N79-26756 #
NADC-79052-60 ..... N79-27014 #

NASA-CASE-ARC-10994-2 ..... N79-26771*
NASA-CASE-ARC-11104-1 ..... N79-26100*

NASA-CASE-GSC-12365-1 ..... N79-26252*#

NASA-CASE-KSC-11069-1 ..... N79-26772*

NASA-CASE-LAR-11889-1 ..... N79-26372*
NASA-CASE-LAR-12592-1 ..... N79-26385*#

NASA-CASE-LEW-13150-1 ..... N79-26474*

NASA-CASE-MFS-23460-1 ..... N79-26075*
NASA-CASE-MFS-23540-1 ..... N79-26475*
NASA-CASE-MFS-23726-1 ..... N79-26439*

NASA-CASE-MPO-14316-1 ..... N79-26312*#
NASA-CASE-MPO-14361-1 ..... N79-26253*#
NASA-CASE-MPO-14617-1 ..... N79-26311*#

NASA-CP-2082 ..... N79-26082*#
NASA-CP-2091 ..... N79-26076*#

NASA-CR-3116 ..... N79-26021*#
NASA-CR-3143 ..... N79-26428*#
NASA-CR-135305 ..... N79-26429*#
NASA-CR-135367 ..... N79-26175*#
NASA-CR-135403 ..... N79-26120*#
NASA-CR-135413 ..... N79-26221*#
NASA-CR-152212 ..... N79-26374*#
NASA-CR-152231 ..... N79-26883*#
NASA-CR-152239 ..... N79-26056*#
NASA-CR-152250 ..... N79-26135*#
NASA-CR-152264 ..... N79-26062*#
NASA-CR-152276 ..... N79-26024*#
NASA-CR-152284 ..... N79-26071*#
NASA-CR-152285 ..... N79-26072*#
NASA-CR-152286 ..... N79-26067*#
NASA-CR-152287 ..... N79-26068*#
NASA-CR-152288 ..... N79-26069*#
NASA-CR-152289 ..... N79-26070*#
NASA-CR-157442 ..... N79-26587*#
NASA-CR-158683 ..... N79-26440*#
NASA-CR-158686 ..... N79-26441*#
NASA-CR-158687 ..... N79-26447*#
NASA-CR-158716 ..... N79-26586*#
NASA-CR-158717 ..... N79-26013*#
NASA-CR-158719 ..... N79-26942*#
NASA-CR-158721 ..... N79-26785*#
NASA-CR-158723 ..... N79-26497*#
NASA-CR-158724 ..... N79-26980*#
NASA-CR-158725 ..... N79-26314*#
NASA-CR-158726 ..... N79-26487*#
NASA-CR-158727 ..... N79-26489*#
NASA-CR-158728 ..... N79-26498*#
NASA-CR-158730 ..... N79-26496*#
NASA-CR-158731 ..... N79-26501*#
NASA-CR-158732 ..... N79-26979*#
NASA-CR-158733 ..... N79-26486*#
NASA-CR-158734 ..... N79-26981*#
NASA-CR-158735 ..... N79-26495*#
NASA-CR-158736 ..... N79-26488*#
NASA-CR-158737 ..... N79-26500*#
NASA-CR-158738 ..... N79-26492*#
NASA-CR-158739 ..... N79-26977*#
NASA-CR-158740 ..... N79-26490*#
NASA-CR-158741 ..... N79-26494*#
NASA-CR-158742 ..... N79-26493*#
NASA-CR-158743 ..... N79-26978*#
NASA-CR-158744 ..... N79-26485*#
NASA-CR-158745 ..... N79-26499*#
NASA-CR-158746 ..... N79-26491*#
NASA-CR-158750 ..... N79-26875*#
NASA-CR-158751 ..... N79-27044*#
NASA-CR-158752 ..... N79-26402*#
NASA-CR-158753 ..... N79-26018*#
NASA-CR-158754 ..... N79-27051*#
NASA-CR-158755 ..... N79-26844*#
NASA-CR-158756 ..... N79-27045*#
NASA-CR-158757 ..... N79-27049*#
NASA-CR-158938 ..... N79-26046*#
NASA-CR-159002 ..... N79-26045*#
NASA-CR-159067 ..... N79-26063*#
NASA-CR-159069 ..... N79-26065*#
NASA-CR-159070 ..... N79-26811*#
NASA-CR-159503 ..... N79-26102*#
NASA-CR-159504 ..... N79-26101*#
NASA-CR-159527 ..... N79-26110*#
NASA-CR-159554 ..... N79-26384*#
NASA-CR-159565 ..... N79-26506*#
NASA-CR-159567 ..... N79-26943*#
NASA-CR-159575-VOL-1 ..... N79-26884*#
NASA-CR-159575-VOL-2 ..... N79-26885*#
NASA-CR-159575-VOL-3 ..... N79-26886*#
NASA-CR-159596 ..... N79-26055*#
NASA-CR-160163 ..... N79-26442*#
NASA-CR-160165 ..... N79-26445*#
NASA-CR-160166 ..... N79-26446*#
NASA-CR-160182 ..... N79-26443*#
NASA-CR-161240 ..... N79-26133*#
NASA-CR-161241 ..... N79-26132*#
NASA-CR-161243 ..... N79-26711*#
NASA-CR-161247 ..... N79-26209*#
NASA-CR-161248 ..... N79-26136*#
NASA-CR-161251 ..... N79-26107*#

NASA-RP-1031 ..... N79-27057*#

NASA-SP-7011(194) N79-26770*

NASA-TM-73832 ..... N79-26502*#
NASA-TM-78301 ..... N79-27043*#
NASA-TM-78302 ..... N79-27002*#
NASA-TM-78577 ..... N79-26715*#
NASA-TM-78590 ..... N79-26762*#
NASA-TM-78593 ..... N79-26014*#
NASA-TM-78595 ..... N79-26009*#
NASA-TM-78596 ..... N79-26035*#
NASA-TM-78599 ..... N79-26017*#
NASA-TM-79027 ..... N79-26476*#
NASA-TM-79103 ..... N79-27023*#
NASA-TM-79144 ..... N79-26019*#
NASA-TM-79163 ..... N79-26503*#
NASA-TM-79174 ..... N79-26504*#
NASA-TM-79177 ..... N79-26316*#

NASA-TM-79186 ..... N79-26505*#
NASA-TM-80051 ..... N79-26015*#
NASA-TM-80055 ..... N79-26023*#
NASA-TM-80059 ..... N79-26881*#
NASA-TM-80085 ..... N79-26064*#
NASA-TM-80089 ..... N79-26810*#
NASA-TM-80098 ..... N79-26052*#
NASA-TM-80106 ..... N79-26782*#
NASA-TM-80107 ..... N79-26781*#
NASA-TM-80114 ..... N79-26427*#
NASA-TM-80444 ..... N79-26444*#
NASA-TM-80474 ..... N79-26016*#
NASA-TM-80477 ..... N79-27053*#

NASA-TP-1434 ..... N79-26020*#
NASA-TP-1468 ..... N79-26022*#
NASA-TP-1482 ..... N79-26057*#

NASDA-TR-8 ..... N79-26103 #

NBS-GCR-ETIP-78-57 ..... N79-27036 #
NBS-GCR-ETIP-78-58 ..... N79-27037 #
NBS-GCR-ETIP-78-58A ..... N79-27038 #

NBS-GCR-79-158 ..... N79-26341 #

NBS-SP-400-57 ..... N79-26994 #
NBS-SP-500-45 ..... N79-26799 #

NBSIR-78-1577 ..... N79-27021 #
NBSIR-79-1599 ..... N79-26289 #
NBSIR-79-1600 ..... N79-26381 #

NCHSR-79-1 ..... N79-26778 #

NEAR-TR-165 ..... N79-26363 #

NIH-N01-HV-3-2913-6 ..... N79-26220 #
NIH-N01-HV-7-2971-1 ..... N79-26780 #

NIH/DF-79/001A ..... N79-26822 #

NOAA-TM-ERL-AOML-34 ..... N79-26759 #

NOAA-TM-ERL-APCL-21 ..... N79-26750 #

NOAA-TM-ERL-ARL-74 ..... N79-26559 #

NOAA-TM-ERL-WPL-40 ..... N79-26758 #

NOAA-TM-NWS-SR-99 ..... N79-26747 #

NOAA-TM-NWS-WR-137 ..... N79-26744 #
NOAA-TM-NWS-WR-138 ..... N79-26742 #

NOAA-TR-ERL-WPL-37 ..... N79-26746 #

NOAA-73031302 ..... N79-26742 #
NOAA-79022702 ..... N79-26760 #
NOAA-79022703 ..... N79-26757 #
NOAA-79022705 ..... N79-26560 #
NOAA-79022710 ..... N79-26748 #
NOAA-79022801 ..... N79-26741 #
NOAA-79022802 ..... N79-26749 #
NOAA-79022805 ..... N79-26559 #
NOAA-79030501 ..... N79-26747 #
NOAA-79030506 ..... N79-26745 #
NOAA-79030706 ..... N79-26746 #
NOAA-79030707 ..... N79-26758 #
NOAA-79030710 ..... N79-26759 #
NOAA-79031301 ..... N79-26744 #
NOAA-79031401 ..... N79-26750 #
NOAA-79031606 ..... N79-27054 #
NOAA-79031607 ..... N79-27055 #
NOAA-79031608 ..... N79-27056 #

NOSC/TD-201 ..... N79-26256 #
NOSC/TD-212 ..... N79-26263 #
NOSC/TD-223 ..... N79-26321 #
NOSC/TD-228-VOL-1 ..... N79-26796 #
NOSC/TR-325 ..... N79-26867 #
NOSC/TR-330 ..... N79-26320 #
NOSC/TR-354 ..... N79-26888 #
NOSC/TR-362 ..... N79-26262 #
NOSC/TR-367 ..... N79-26793 #
NOSC/TR-372 ..... N79-26325 #

NPL-AC-88 ..... N79-26890 #

NPL-CHEM-94 ..... N79-26197 #
NPL-CHEM-96 ..... N79-26219 #

NPL-DNACS-8/78 ..... N79-26820 #
NPL-DNACS-9/78 ..... N79-26862 #
NPL-DNACS-10/78 ..... N79-26863 #
NPL-DNACS-11/78 ..... N79-26051 #
NPL-DNACS-12/79 ..... N79-26368 #
NPL-DNACS-13/79 ..... N79-26864 #

NPL-QU-AR-76 ..... N79-26736 #

NRC/CNR-TT-1938 ..... N79-26172 #
NRC/CNR-TT-1942 ..... N79-26173 #

NRL-MR-3911 ..... N79-26387 #
NRL-MR-3919 ..... N79-26596 #
NRL-MR-3922 ..... N79-26944 #
NRL-MR-3940 ..... N79-26598 #
NRL-MR-3954 ..... N79-26139 #
NRL-MR-3960 ..... N79-26213 #

NRL-8290 ..... N79-26732 #

NRTC-79-6R ..... N79-26388 #

NSF/IDOE-79/27 ..... N79-26761 #
NSF/IDOI/CUBA/DR-55 ..... N79-26761 #
NSF/RA-780462 ..... N79-26612 #
NSF/RA-780527 ..... N79-26244 #
NSF/RA-780529 ..... N79-26243 #

NSWC/DL-TR-79-102 ..... N79-26814 #
NSWC/DR-TR-3936 ..... N79-26813 #

NTIA/REPORT-79/14 ..... N79-26288 #

NTIS/PS-75/134 ..... N79-27060 #
NTIS/PS-75/224 ..... N79-26033 #
NTIS/PS-76/0259 ..... N79-26033 #
NTIS/PS-76/0328 ..... N79-27060 #
NTIS/PS-77/0317 ..... N79-26033 #
NTIS/PS-77/0427 ..... N79-27060 #
NTIS/PS-78/0320 ..... N79-26033 #
NTIS/PS-78/0406 ..... N79-27060 #
NTIS/PS-79/0368/5 ..... N79-26033 #
NTIS/PS-79/0386/7 ..... N79-27059 #
NTIS/PS-79/0387/5 ..... N79-27060 #

NTSB-AAR-79-8 ..... N79-26034 #

NUREG-CR-0495-VOL-1 ..... N79-26922 #
NUREG-CR-0495-VOL-3 ..... N79-26924 #
NUREG-CR-0495-VOL-4 ..... N79-26925 #
NUREG-CR-0495-VOL-5 ..... N79-26904 #
NUREG-CR-0495-VOL-6 ..... N79-26926 #
NUREG-CR-0495-VOL-7 ..... N79-26927 #
NUREG-CR-0589 ..... N79-26409 #
NUREG-CR-0652 ..... N79-26198 #
NUREG-CR-0666 ..... N79-26610 #

NUREG/CR-0472 ..... N79-26433 #
NUREG/CR-1458 ..... N79-26906 #

NUSC-TR-5929 ..... N79-26887 #

NVL-0059-008 ..... N79-26984 #

NWC-TP-6083 ..... N79-26816 #

ONRT-81 ..... N79-26361 #

OPEN-FILE-78/1024 ..... N79-26612 #

OREN-79004 ..... N79-26849 #

ORNL-NIS-144 ..... N79-27018 #

ORNL-TM-6629 ..... N79-26954 #
ORNL-TM-6644 ..... N79-26179 #

ORP/EAD-78/4 ..... N79-26290 #

OSU-CISRC-TR-78-5-PT-1 ..... N79-27007 #
OSU-CISRC-TR-78-5-PT-2 ..... N79-27007 #

OTA-A-85 ..... N79-27027 #

OU-ANNE-78-2 ..... N79-26028 #
OU-ANNE-78-10 ..... N79-26027 #
OU-ANNE-78-11 ..... N79-26026 #

OUEL-1255/78 ..... N79-26369 #
OUEL-1259/78 ..... N79-26833 #
OUEL-1265/78 ..... N79-26436 #

OWRT-A-029-COLO(2) ..... N79-26466 #
OWRT-A-046-NH(1) ..... N79-27034 #
OWRT-A-046-TENN(3) ..... N79-27035 #
OWRT-A-053-OHIO(1) ..... N79-26556 #
OWRT-A-063-CAL(1) ..... N79-26562 #
OWRT-A-078-1CAN(1) ..... N79-26578 #

OWRT-I-133(9076)(1) ..... N79-26458 #

P-52/D-08/77-10 ..... N79-26367 #

P/51/76/14 ..... N79-26240 #
P/51/76/17 ..... N79-26535 #
P/51/77/21 ..... N79-26536 #
P/51/77/24 ..... N79-26537 #
P/539/77/06 ..... N79-26152 #
P/539/77/12 ..... N79-26335 #
P/539/77/13 ..... N79-26189 #
P/539/77/23 ..... N79-26532 #
P/539/77/28 ..... N79-26190 #
P/539/77/30 ..... N79-26533 #
P/539/77/31 ..... N79-26191 #
P/539/77/38 ..... N79-26192 #

PB-292160/9 ..... N79-27025 #
PB-292256/5 ..... N79-26450 #
PB-292303/5 ..... N79-26451 #
PB-292372/0 ..... N79-26288 #
PB-292380/3 ..... N79-26563 #
PB-292500/6 ..... N79-26449 #
PB-292526/1 ..... N79-26565 #
PB-292552/7 ..... N79-26233 #
PB-292557/6 ..... N79-26778 #
PB-292560/0 ..... N79-26453 #
PB-292645/9 ..... N79-26382 #
PB-292647/5 ..... N79-26290 #
PB-292677/2 ..... N79-26455 #
PB-292703/6 ..... N79-26566 #
PB-292736/6 ..... N79-26454 #
PB-292742/4 ..... N79-26768 #
PB-292748/1 ..... N79-26551 #
PB-292749/9 ..... N79-26153 #
PB-292751/5 ..... N79-26561 #
PB-292756/4 ..... N79-26552 #
PB-292760/6 ..... N79-26553 #
PB-292761/4 ..... N79-26609 #
PB-292763/0 ..... N79-27029 #
PB-292776/2 ..... N79-26554 #
PB-292777/0 ..... N79-26198 #
PB-292781/2 ..... N79-27024 #
PB-292787/9 ..... N79-26245 #
PB-292798/6 ..... N79-26243 #
PB-292806/7 ..... N79-26341 #
PB-292816/6 ..... N79-26542 #
PB-292820/8 ..... N79-26555 #
PB-292838/0 ..... N79-26246 #
PB-292851/3 ..... N79-27036 #
PB-292852/1 ..... N79-27037 #
PB-292853/9 ..... N79-27038 #
PB-292855/4 ..... N79-26779 #
PB-292872/9 ..... N79-26456 #
PB-292882/8 ..... N79-27026 #
PB-292895/0 ..... N79-26822 #
PB-292929/7 ..... N79-26199 #
PB-292930/5 ..... N79-26241 #
PB-292931/3 ..... N79-26564 #
PB-292933/9 ..... N79-26291 #
PB-292934/7 ..... N79-26292 #
PB-292947/9 ..... N79-26539 #
PB-292949/5 ..... N79-26538 #
PB-292954/5 ..... N79-26452 #
PB-292961/0 ..... N79-26743 #
PB-292967/7 ..... N79-26289 #
PB-292972/7 ..... N79-27028 #
PB-292978/4 ..... N79-26381 #
PB-292989/1 ..... N79-26556 #
PB-292995/8 ..... N79-26557 #
PB-292998/2 ..... N79-26751 #

PB-293031/1 ..... N79-26562 #
PB-293033/7 ..... N79-27020 #
PB 293043/6 ..... N79-26242 #
PB-293069/1 ..... N79-26540 #
PB-293085/7 ..... N79-26573 #
PB-293088/1 ..... N79-27027 #
PB-293106/1 ..... N79-26570 #
PB-293119/4 ..... N79-26613 #
PB-293120/2 ..... N79-26614 #
PB-293121/0 ..... N79-26615 #
PB-293147/5 ..... N79-27034 #
PB-293161/6 ..... N79-26469 #
PB-293162/4 ..... N79-26470 #
PB-293163/2 ..... N79-26575 #
PB-293164/0 ..... N79-26574 #
PB-293165/7 ..... N79-26235 #
PB-293170/7 ..... N79-27021 #
PB-293172/3 ..... N79-27033 #
PB-293181/4 ..... N79-26752 #
PB-293210/1 ..... N79-26236 #
PB-293211/9 ..... N79-26468 #
PB-293225/9 ..... N79-26569 #
PB-293226/7 ..... N79-26579 #
PB-293227/5 ..... N79-26580 #
PB-293229/1 ..... N79-26572 #
PB-293232/5 ..... N79-26823 #
PB-293245/7 ..... N79-27032 #
PB-293252/3 ..... N79-26457 #
PB-293254/9 ..... N79-27031 #
PB-293267/1 ..... N79-26200 #
PB-293269/7 ..... N79-26571 #
PB-293279/6 ..... N79-26237 #
PB-293293/7 ..... N79-26994 #
PB-293328/1 ..... N79-26234 #
PB-293336/4 ..... N79-26548 #
PB-293360/4 ..... N79-26154 #
PB-293363/8 ..... N79-26581 #
PB-293376/0 ..... N79-26568 #
PB-293377/8 ..... N79-26761 #
PB-293378/6 ..... N79-26465 #
PB-293380/2 ..... N79-27030 #
PB-293401/6 ..... N79-26922 #
PB-293402/4 ..... N79-26923 #
PB-293403/2 ..... N79-26924 #
PB-293404/0 ..... N79-26925 #
PB-293405/7 ..... N79-26904 #
PB-293406/5 ..... N79-26926 #
PB-293407/3 ..... N79-26927 #
PB-293427/1 ..... N79-26462 #
PB-293431/3 ..... N79-26461 #
PB-293434/7 ..... N79-26460 #
PB-293435/4 ..... N79-26459 #
PB-293436/2 ..... N79-26576 #
PB-293441/2 ..... N79-26463 #
PB-293442/0 ..... N79-26464 #
PB-293458/6 ..... N79-27007 #
PB-293466/9 ..... N79-26760 #
PB-293472/7 ..... N79-26741 #
PB-293484/2 ..... N79-26458 #
PB-293485/9 ..... N79-26611 #
PB-293502/1 ..... N79-26577 #
PB-293510/4 ..... N79-26780 #
PB-293513/8 ..... N79-27035 #
PB-293516/1 ..... N79-26467 #
PB-293529/4 ..... N79-26567 #
PB-293530/2 ..... N79-26410 #
PB-293561/7 ..... N79-26244 #
PB-293570/8 ..... N79-26220 #
PB-293579/9 ..... N79-26612 #
PB-293580/7 ..... N79-26412 #
PB-293597/1 ..... N79-26558 #
PB-293604/5 ..... N79-26578 #
PB-293632/6 ..... N79-26757 #
PB-293647/4 ..... N79-26466 #
PB-293660/7 ..... N79-26409 #
PB-293661/5 ..... N79-26610 #
PB-293733/2 ..... N79-26759 #
PB-293741/5 ..... N79-26559 #
PB-293772/0 ..... N79-26411 #
PB-293806/6 ..... N79-26758 #
PB-293810/8 ..... N79-26747 #
PB-293879/3 ..... N79-26746 #
PB-293906/4 ..... N79-26560 #
PB-293928/7 ..... N79-26748 #
PB-294129/2 ..... N79-26749 #
PB-294148/2 ..... N79-26799 #
PB-294210/0 ..... N79-26750 #
PB-294216/7 ..... N79-26742 #
PB-294324/9 ..... N79-26744 #
PB-294326/4 ..... N79-26745 #

PB-294813/0 ..... N79-26541 #
PB-294543/4 ..... N79-26800 #
PB-294770/3 ..... N79-27054 #
PB-294771/1 ..... N79-27055 #
PB-294772/9 ..... N79-27056 #

PERRE-TR-99 ..... N79-26112 #

PHYSICAL RESEARCH-80 ..... N79-26242 #

PH/78/6 ..... N79-26854 #

PWL-SA-6832 ..... N79-26543 #

PWL-2764 ..... N79-26911 #

PPPL-1488 ..... N79-26947 #
PPPL-1512 ..... N79-26958 #

PR-8 ..... N79-26215 #

PUB-41055 ..... N79-26457 #

PUBL-95-114 ..... N79-26507 #
PUBL-96-1 ..... N79-26509 #
PUBL-96-9 ..... N79-26508 #

PWA-5523-42 ..... N79-26055*#

PWRRC-TR-121 ..... N79-26468 #

QIR-9 ..... N79-26059 #

QPR-2 ..... N79-26981*#
QPR-4 ..... N79-26492*#
QPR-4 ..... N79-26980*#
QPR-6 ..... N79-26496*#
QPR-14 ..... N79-26977*#

QR-1 ..... N79-26501*#
QR-2 ..... N79-26490*#
QR-3 ..... N79-26488*#
QR-3 ..... N79-26495*#
QR-3 ..... N79-26500*#
QR-6 ..... N79-26489*#
QR-12 ..... N79-26979*#

QTPR-15 ..... N79-26487*#

RADC-TR-78-267 ..... N79-26318 #
RADC-TR-79-7 ..... N79-26932 #
RADC-TR-79-26 ..... N79-26933 #
RADC-TR-79-55 ..... N79-26829 #

RAE-TM-EP-613 ..... N79-26040 #

RAE-TM-IT-165 ..... N79-26798 #
RAE-TM-IT-177 ..... N79-26379 #

RAE-TM-MATH-COMP-7807 ..... N79-26832 #

RAE-TR-77110 ..... N79-26871 #
RAE-TR-77140 ..... N79-26378 #
RAE-TR-77191 ..... N79-26109 #
RAE-TR-78005 ..... N79-26218 #
RAE-TR-78034 ..... N79-26193 #
RAE-TR-78057 ..... N79-26797 #
RAE-TR-78063 ..... N79-26407 #
RAE-TR-78076 ..... N79-26279 #
RAE-TR-78081 ..... N79-26106 #
RAE-TR-78110 ..... N79-26174 #

REP-78-18 ..... N79-26761 #

REPT-1WW-TM-79-1 ..... N79-26731 #
REPT-3-78 ..... N79-26099 #
REPT-40 ..... N79-26623 #
REPT-77/HP-40-241 ..... N79-26534 #
REPT-78-05-02 ..... N79-27011 #
REPT-78-11-02 ..... N79-27010 #
REPT-79-02-04 ..... N79-27003 #
REPT-79-03-05 ..... N79-26812 #
REPT-79-03-06 ..... N79-27015 #
REPT-79-03-07 ..... N79-27013 #
REPT-79-03-08 ..... N79-27012 #
REPT-79-017 ..... N79-26711*#
REPT-79-020 ..... N79-26107*#
REPT-79/PH/2 ..... N79-26541 #
REPT-1842-REG/RETT-TR-79-9 ..... N79-26259 #

REPT-7710 ..... N79-26030 #
REPT-9290-1-79 ..... N79-26780 #

RESEARCH STUDY-63-14-PT-1 ..... N79-26245 #

RI/LAD/HA/78-415 ..... N79-26177 #

ROR-OR-4-PT-2 ..... N79-27046 #

RR-1 ..... N79-26847 #
RR-21 ..... N79-27034 #
RR-78-3 ..... N79-26265 #
RR-78-3-VOL-1 ..... N79-26469 #
RR-78-3-VOL-2 ..... N79-26470 #
RR-148 ..... N79-26846 #

RSRE-78012 ..... N79-26825 #

RTI/1600/00-05F ..... N79-26795 #

R77-719021 ..... N79-26403 #
R78-4-536 ..... N79-26246 #
R78-4-536-PT-1 ..... N79-26245 #
R79AEG166-VOL-1 ..... N79-26884*#
R79AEG166-VOL-2 ..... N79-26885*#
R79AEG166-VOL-3 ..... N79-26886*#
R79AEG367 ..... N79-26221*#
R79ERH1 ..... N79-26322 #

S-REPT-95-1129 ..... N79-27009 #

S-100-Q11 ..... N79-26978*#
S-100-Q12 ..... N79-26979*#
S-495 ..... N79-27057*#

S/IS-7703 ..... N79-26843 #
S/IS-7805-PT-2 ..... N79-26851 #
S/IS-7901 ..... N79-26831 #

SACLANTCEN-SR-H-90 ..... N79-26754 #

SAMSO-TR-78-78 ..... N79-26134 #
SAMSO-TR-78-108 ..... N79-26313 #
SAMSO-TR-79-21 ..... N79-26317 #

SAND-78-0029 ..... N79-26906 #
SAND-78-0397C ..... N79-26512 #
SAND-78-0979 ..... N79-26530 #
SAND-78-1359 ..... N79-26909 #
SAND-78-2240 ..... N79-26146 #
SAND-78-8266 ..... N79-26332 #
SAND-79-0001 ..... N79-26528 #
SAND-79-8200 ..... N79-26183 #

SASR-14 ..... N79-26440*#

SATR-5 ..... N79-26984 #

SGD-414 ..... N79-27056 #
SGD-414-PT-1 ..... N79-27054 #
SGD-414-PT-2 ..... N79-27055 #

SLAC-PUB-2177 ..... N79-26914 #
SLAC-PUB-2220 ..... N79-27019 #
SLAC-PUB-2237 ..... N79-26905 #

SR-1 ..... N79-26013*#
SR-1 ..... N79-26043 #

SRI-HP-79-16 ..... N79-26592 #

SU-I2R-787 ..... N79-26942*#

SZ-ISSN-0080-7346 ..... N79-26623 #

TAC/XPB-TN-79-5 ..... N79-27005 #

TASC-TR-1210-1-VOL-1 ..... N79-26922 #
TASC-TR-1210-1-VOL-2 ..... N79-26923 #
TASC-TR-1210-1-VOL-3 ..... N79-26924 #
TASC-TR-1210-1-VOL-4 ..... N79-26925 #
TASC-TR-1210-1-VOL-5 ..... N79-26908 #
TASC-TR-1210-1-VOL-6 ..... N79-26926 #
TASC-TR-1210-1-VOL-7 ..... N79-26927 #

TCRL-13 ..... N79-26060 #

TDB-314 ..... N79-26417 #
TDB-317 ..... N79-26408 #

TDB-318 ..... N79-26380 #

TI-08-77-49 ..... N79-26341 #

TN-1978-46 ..... N79-26258 #

TR-M-2 ..... N79-26850 #

TR-3 ..... N79-26432 #
TR-5 ..... N79-26982 #
TR-10 ..... N79-26138 #
TR-18 ..... N79-26712 #
TR-19 ..... N79-26713 #
TR-19 ..... N79-26794 #
TR-20 ..... N79-26714 #
TR-23(ONR) ..... N79-26210 #
TR-27-6 ..... N79-26989 #
TR-28 ..... N79-26141 #
TR-78-6 ..... N79-26848 #
TR-002 ..... N79-26986 #
TR-160 ..... N79-27004 #
TR-172 ..... N79-26845 #
TR-0078(3950-04)-4 ..... N79-26313 #
TR-0078(3970-40)-3 ..... N79-26134 #
TR-0079(4920)-1 ..... N79-26317 #

TRB/TRR-667 ..... N79-27029 #

TRW-33292-000 ..... N79-26988 #

TT-7805 ..... N79-26066 #
TT-7902 ..... N79-26010 #

TUR-LRT-TR-77/5-PT-1 ..... N79-26113 #
TUR-LRT-TR-77/6-PT-2 ..... N79-26114 #
TUR-LRT-TR-77/7-PT-3 ..... N79-26115 #
TUR-LRT-TR-77/14-PT-4 ..... N79-26116 #
TUR-LRT-TR-78/1-PT-5 ..... N79-26117 #
TUR-LRT-TR-78/2-PT-6 ..... N79-26118 #
TUR-LRT-TR-78/5 ..... N79-27052 #
TUR-LRT-TR-78/6-1 ..... N79-26081 #
TUR-LRT-TR-78/6-2 ..... N79-26108 #

TUR-NITT-145 ..... N79-26105 #

UC-75-C-0671-78 ..... N79-26894 #

UCID-18031 ..... N79-26948 #

UCRL-13939 ..... N79-26991 #
UCRL-13945 ..... N79-26907 #
UCRL-52623 ..... N79-26121 #
UCRL-80114 ..... N79-27000 #
UCRL-81099-REV-1 ..... N79-26949 #
UCRL-81120 ..... N79-26956 #
UCRL-81155 ..... N79-26150 #
UCRL-81259-REV-1 ..... N79-26524 #
UCRL-81371 ..... N79-26377 #
UCRL-81946 ..... N79-26950 #
UCRL-82171 ..... N79-26514 #

UIEM-78-4 ..... N79-26323 #

UILU-ENG-78-2546 ..... N79-26323 #
UILU-ENG-79-2504 ..... N79-26587*#
UILU-ENG-79-2506 ..... N79-26588 #

UIO-SR-78-03 ..... N79-26599 #
UIO-SR-78-04 ..... N79-26267 #
UIO-SR-78-05 ..... N79-26600 #

UMTA-MI-11-0017-79-1 ..... N79-27024 #

UNI-1190 ..... N79-26395 #

UR-669 ..... N79-26912 #
UR-673 ..... N79-26895 #

US-PATENT-APPL-SN-039031 ..... N79-26252*#
US-PATENT-APPL-SN-041141 ..... N79-26385*#
US-PATENT-APPL-SN-051269 ..... N79-26311*#
US-PATENT-APPL-SN-051276 ..... N79-26312*#
US-PATENT-APPL-SN-053572 ..... N79-26253*#
US-PATENT-APPL-SN-662182 ..... N79-26372*
US-PATENT-APPL-SN-746578 ..... N79-26075*
US-PATENT-APPL-SN-759965 ..... N79-26771*
US-PATENT-APPL-SN-848418 ..... N79-26439*
US-PATENT-APPL-SN-854920 ..... N79-26100*
US-PATENT-APPL-SN-863773 ..... N79-26475*

US-PATENT-APPL-SN-876438 ..... N79-26772*
US-PATENT-APPL-SN-914260 ..... N79-26474*

US-PATENT-CLASS-3-1.9 ..... N79-26772*
US-PATENT-CLASS-3-2 ..... N79-26772*
US-PATENT-CLASS-3-12 ..... N79-26772*
US-PATENT-CLASS-13-20 ..... N79-26075*
US-PATENT-CLASS-13-22 ..... N79-26075*
US-PATENT-CLASS-13-24 ..... N79-26075*
US-PATENT-CLASS-29-572 ..... N79-26475*
US-PATENT-CLASS-29-577 ..... N79-26475*
US-PATENT-CLASS-29-578 ..... N79-26475*
US-PATENT-CLASS-29-580 ..... N79-26475*
US-PATENT-CLASS-33-1H N79-26439*
US-PATENT-CLASS-33-1Q N79-26439*
US-PATENT-CLASS-33-174L N79-26439*
US-PATENT-CLASS-73-178R N79-26372*
US-PATENT-CLASS-73-626 ..... N79-26771*
US-PATENT-CLASS-105-161 ..... N79-26439*
US-PATENT-CLASS-128-660 ..... N79-26771*
US-PATENT-CLASS-219-410 ..... N79-26075*
US-PATENT-CLASS-244-121 ..... N79-26100*
US-PATENT-CLASS-260-37EP N79-26100*
US-PATENT-CLASS-260-830S N79-26100*
US-PATENT-CLASS-264-102 ..... N79-26100*
US-PATENT-CLASS-264-145 ..... N79-26100*
US-PATENT-CLASS-264-151 ..... N79-26100*
US-PATENT-CLASS-264-175 ..... N79-26100*
US-PATENT-CLASS-264-236 ..... N79-26100*
US-PATENT-CLASS-299-1 ..... N79-26439*
US-PATENT-CLASS-308-10 ..... N79-26372*
US-PATENT-CLASS-357-45 ..... N79-26475*
US-PATENT-CLASS-364-560 ..... N79-26439*
US-PATENT-CLASS-428-220 ..... N79-26100*
US-PATENT-CLASS-428-413 ..... N79-26100*
US-PATENT-CLASS-428-414 ..... N79-26100*
US-PATENT-CLASS-428-418 ..... N79-26100*
US-PATENT-CLASS-428-421 ..... N79-26100*
US-PATENT-CLASS-428-920 ..... N79-26100*
US-PATENT-CLASS-429-15 ..... N79-26474*
US-PATENT-CLASS-429-101 ..... N79-26474*

US-PATENT-4,154,230 ..... N79-26771*
US-PATENT-4,156,309 ..... N79-26475*
US-PATENT-4,156,548 ..... N79-26372*
US-PATENT-4,156,752 ..... N79-26100*
US-PATENT-4,156,971 ..... N79-26439*
US-PATENT-4,158,742 ..... N79-26075*
US-PATENT-4,158,895 ..... N79-26772*
US-PATENT-4,159,366 ..... N79-26474*

USAAVRADCOM-TR-78-46 ..... N79-26214 #

USAEFA-77-33 ..... N79-26047 #

USARTL-TR-78-48 ..... N79-26050 #

USGS/WDB/IR-77/1 ..... N79-26450 #
USGS/WRD/BD-78/070 ..... N79-26450 #
USGS/WRD/WRI-79/005 ..... N79-26451 #
USGS/WRD/WRI-79/008 ..... N79-26455 #
USGS/WRI-78/90 ..... N79-26451 #
USGS/WRI-78/105 ..... N79-26455 #

UTIAS-TN-219 ..... N79-26373 #

UTIAS-226 ..... N79-26360 #

VTH-LR-270 ..... N79-26187 #

WES-MP-0-79-1 ..... N79-26815 #

WES-TR-EL-79-1 ..... N79-26591 #

WSRL-0056-TR ..... N79-26359 #

W79-04557 ..... N79-26453 #
W79-04958 ..... N79-26556 #
W79-04962 ..... N79-26562 #
W79-05013 ..... N79-26752 #
W79-05046 ..... N79-27034 #
W79-05049 ..... N79-26466 #
W79-05091 ..... N79-26457 #
W79-05092 ..... N79-26468 #
W79-05234 ..... N79-26578 #
W79-05400 ..... N79-27035 #
W79-05401 ..... N79-26458 #

☆U.S. GOVERNMENT PRINTING OFFICE: 1979-281-439/17

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to eleven special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
OKLAHOMA
University of Oklahoma, Bizzell Library
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York 10017.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESA - Information Retrieval Service, European Space Agency, 8-10 rue Mario-Nikis, 75738 Paris CEDEX 15, France.

National Aeronautics and
Space Administration

Washington, D.C.
20546

Official Business
Penalty for Private Use $300

SPECIAL FOURTH CLASS MAIL
Book

Postage and Fees Paid
National Aeronautics and
Space Administration
NASA-451

U.S.MAIL

POSTMASTER: If undeliverable (Section 158
Postal Manual) Do Not Return